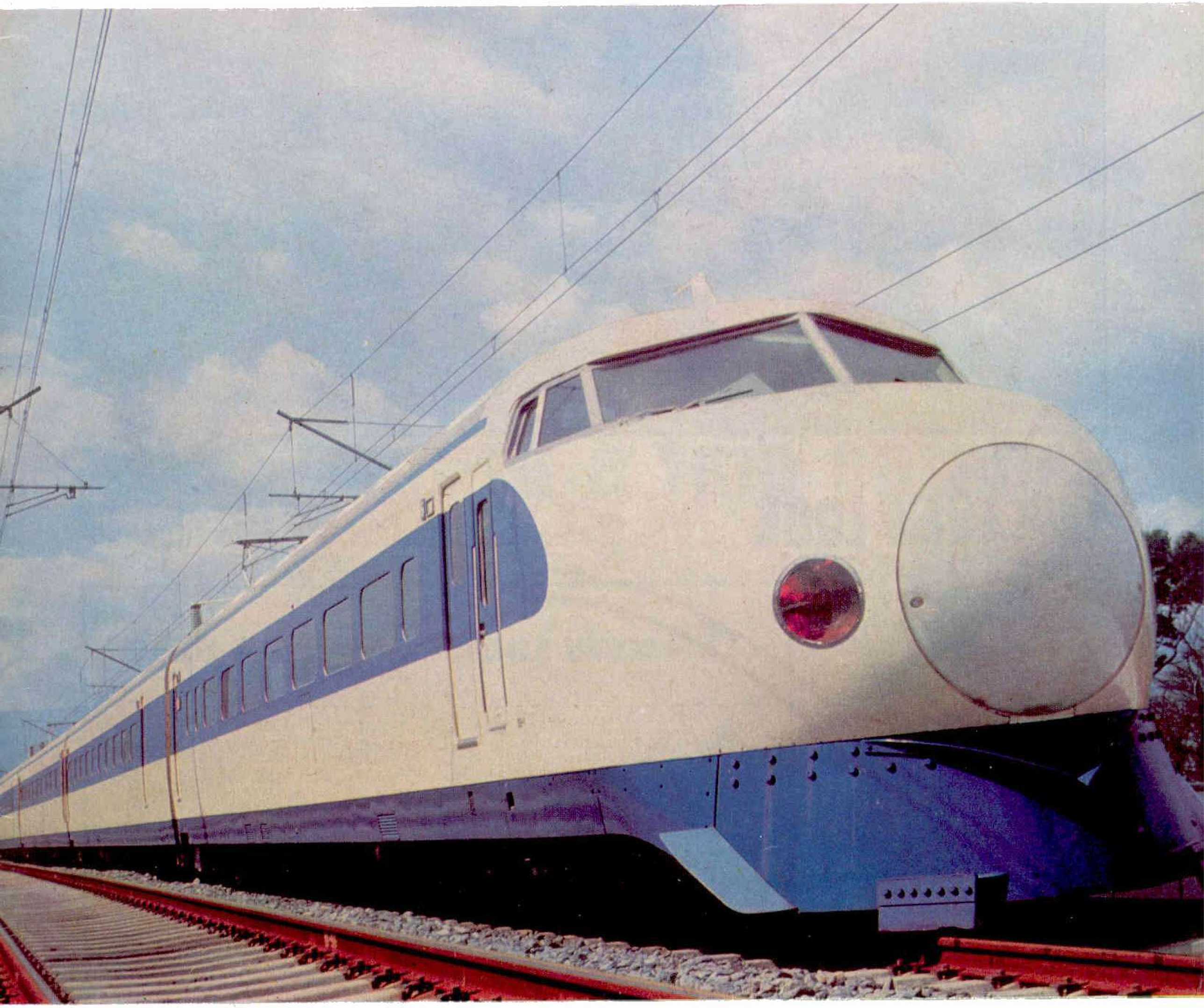
Build Your Own Hovercraft—Plans Inside

meccano magazine

January

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the practical boy's hobbies magazine

1965

IN THIS ISSUE

- Principles of Radio Control
- Photographing in Close-up

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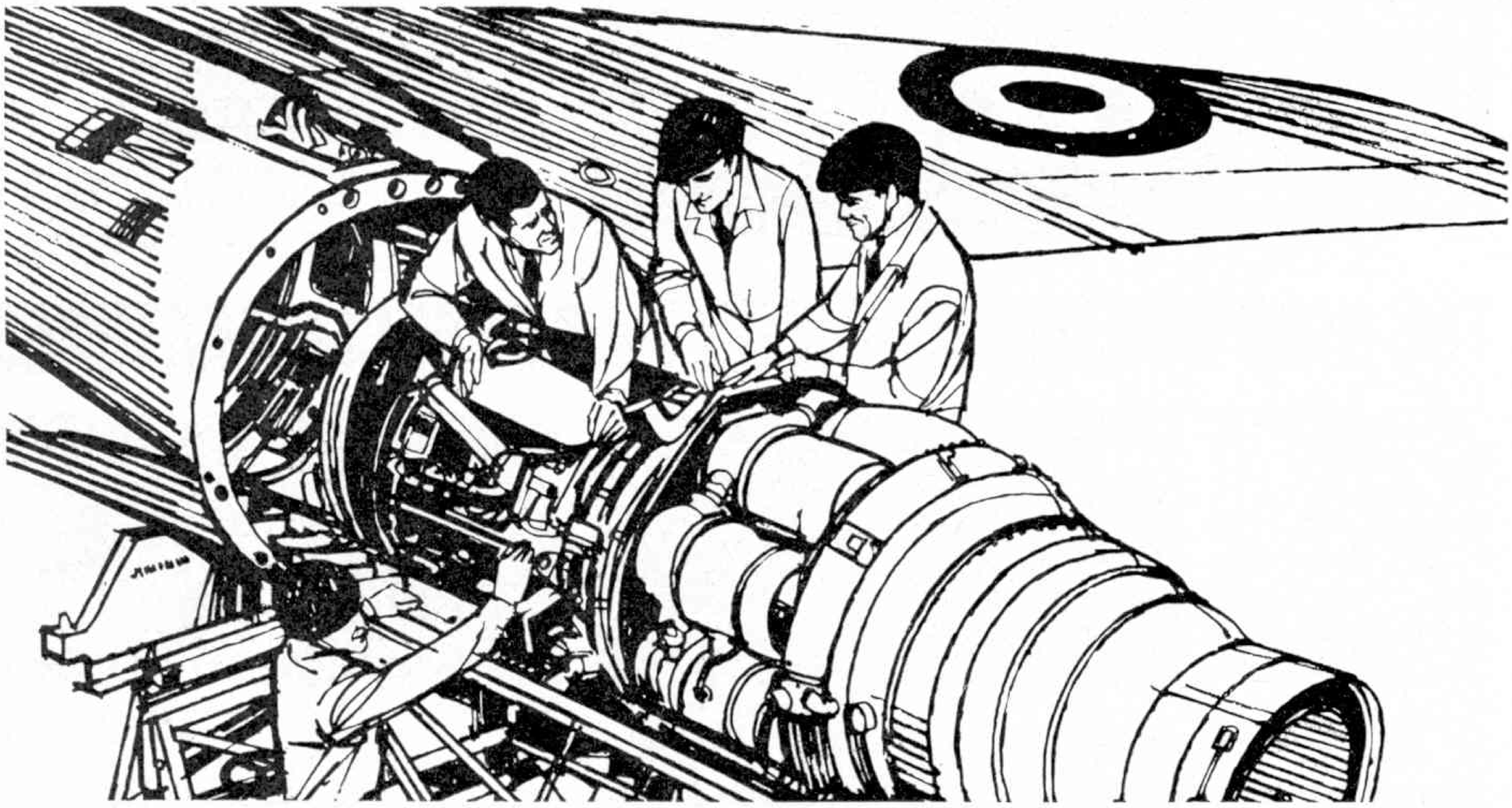
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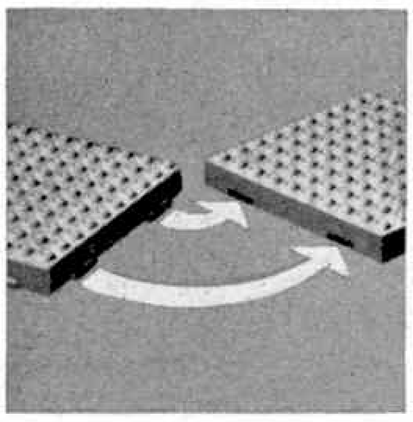
The Royal Air Force

CLIKI

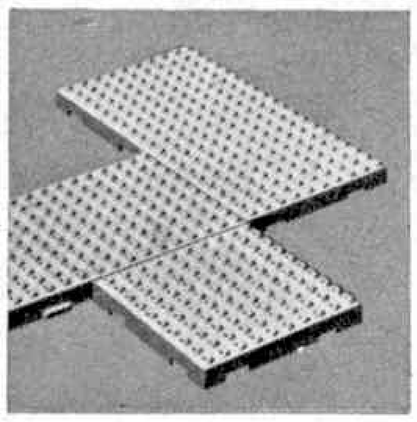
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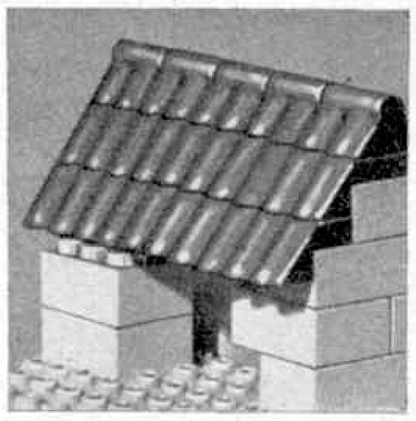
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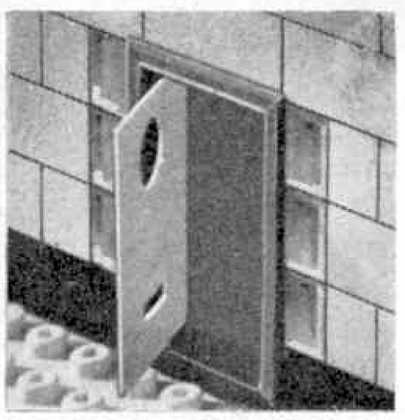




roofs that have tiles and look just like real roofs



windows that open and shut



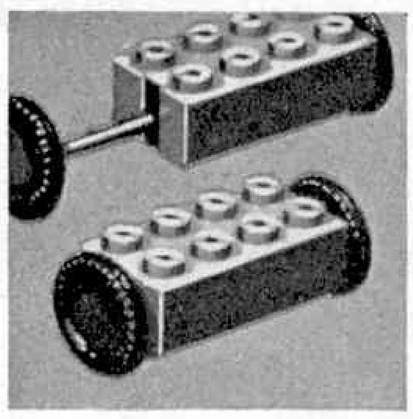
doors that are hinged to open and close



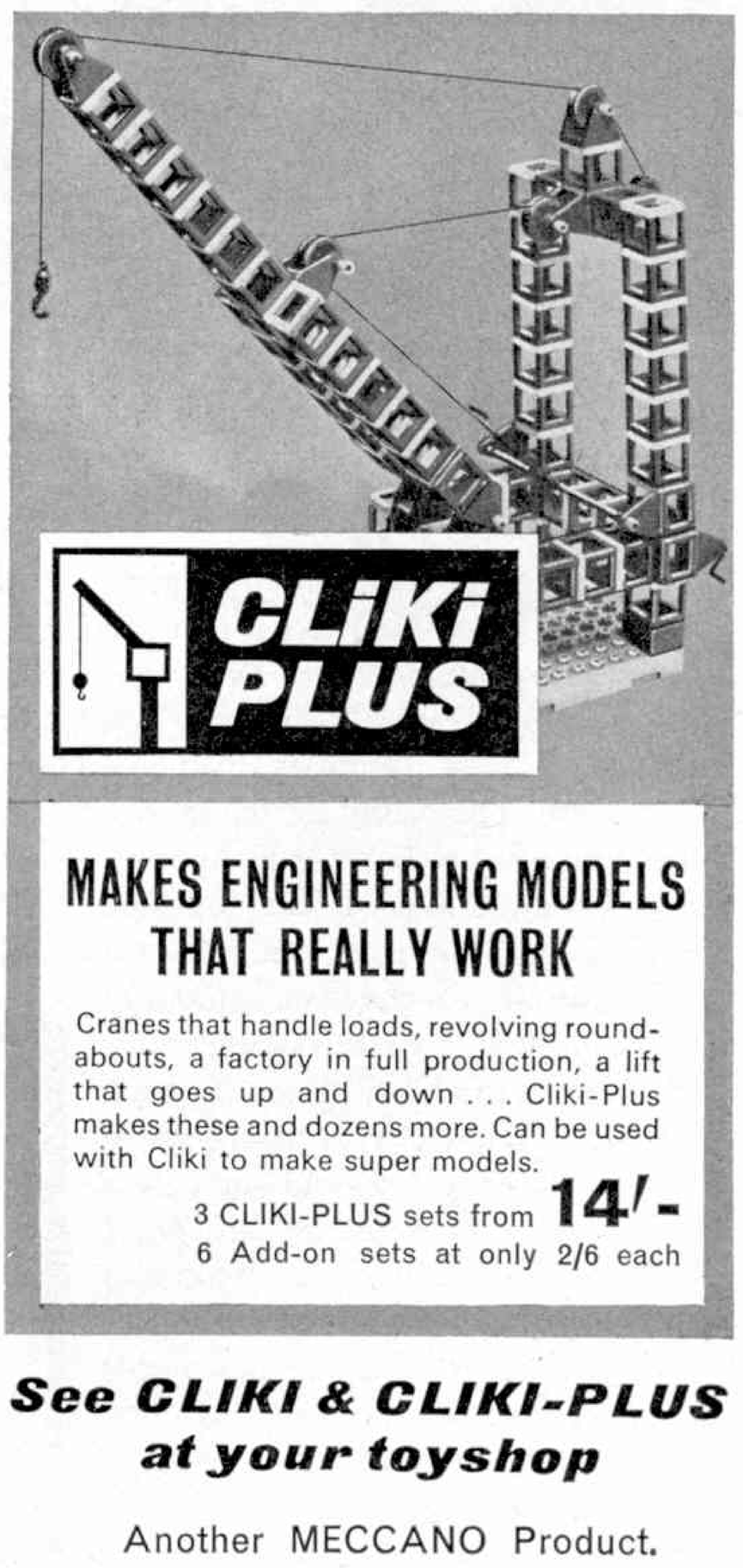
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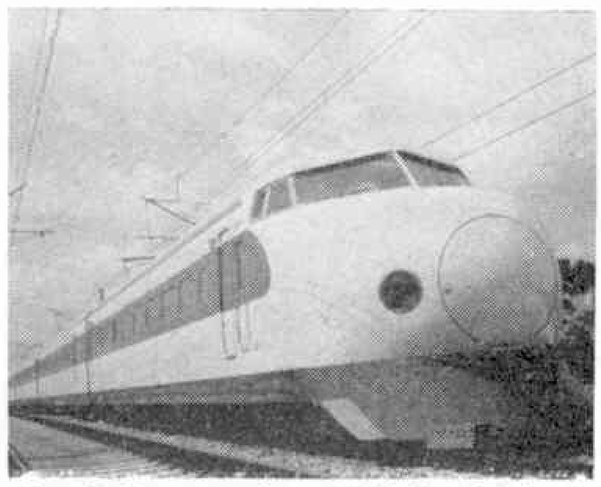
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AEROMODELLING ■ RADIO ■ ELECTRONICS ■ CAMPING ■ CYCLING ■ STAMPS ■ FISHING

Contents

Signals from Space	4
Mailbag	7
Close-up Photography	8
Camping	9
Build a Hovercraft	10
What's Your Problem?	13
Cars—Past and Future	14
Air News—Flying Sandwiches	16
Puzzle Page	19
Radio Control	20
Paper Sculpture	23
Story—Double Trouble	24
Trains—Riding the Footplate	27
Stamps	29
Cycles—Fit a Dynamo	30
Meccano Section	31—44
Window Shopping	45



Front Cover: *Japan's Bullet Train is capable of speeds up to 125 m.p.h. and covers the 320 miles between Tokyo and Osaka in approximately four hours. Work commenced on this new railway in April 1959 and was completed in October 1964, just in time for the Olympic Games*

Ordering the Meccano Magazine Overseas
Readers overseas can order the Meccano Magazine from Meccano dealers or direct from the publishers. The subscription rate for 12 months is the equivalent of 20s. sterling at the current rate of exchange, U.S.A. and Canada $3.00

Win an Electronic Kit

HOW would you like to win a marvellous Philips Electronic Kit absolutely free? You can build over 20 different working units from these kits including an electronic organ, a transistor radio, a burglar alarm and a morse code signaller! No matter what your age, you stand a chance of winning a major award, for age will be taken into consideration when judging the entries. There are **eight** 1st prizes, **eight** 2nd prizes and a host of runner-up awards to make a total of 50 exciting Philips Electronic Kits to be won!

Radio electronics is a very absorbing hobby and Philips have simplified this rather complex pastime in order that any boy can build his own electronic equipment. All the kits are transistorised, which means that only low voltages—torch batteries—are needed to operate the electrical equipment. Therefore, anybody can use the Philips kits in complete safety.

By now you are all probably wondering how you can enter the competition. The answer — buy next month's issue of Meccano Magazine. I am at present helping to prepare the competition and I think you will find it very interesting, quite simple and very easy to enter. If you haven't a regular order for the magazine, place one with your newsagent, NOW! This will avoid the disappointment of not being able to buy a copy of the magazine and entering this super competition.

Some of you may have seen the Philips Electronic Kits at the last Radio Show, Earls Court. There, Philips ran a contest for boys and girls to see who could assemble one of the kit circuits in the shortest time. The winner was a Meccano Magazine reader, Clifford Hones of Harlow, in Essex. For winning the contest, Clifford was presented with a portable tape recorder by Harry Secombe. A photograph of the presentation is shown below.

If you're interested in seeing one of the Philips Electronic Kits, before taking part in the competition, visit our stand at the *Schoolboys and Girls Exhibition, National Hall, Olympia from December 28th to January 9th.* My staff and I will be delighted to meet you and show you one of the prizes in next month's competition.

Merry Christmas and a Happy New Year.

Finally, before I sign off for this month I'd like to take this opportunity of wishing you all a merry Christmas from the directors and staff of Meccano Magazine and if you receive the magazine after Christmas, may we wish you a very happy and prosperous New Year.

The Editor



Meccano Magazine reader, Clifford Hones of Harlow, Essex, is presented with a portable tape recorder by Harry Secombe, after winning the Philips Electronic Kit contest at the 1964 Radio Show, Earls Court

Want to sell an Elephant?
See page 47 and fill in the form. You can buy, sell or exchange through M.M.



SIGNALS FROM OUTER SPACE

PERHAPS one of the most outstanding wonders of science today is Australia's Radio Telescope. Acquired in 1961 for the Radio Physics Laboratory of the Commonwealth Scientific and Industrial Research Organisation, it is built on farmland some 13 miles north-west of Parkes, in New South Wales. This site was chosen because its extremely low electrical noise level allows very weak signals from distant stars to be received without interference.

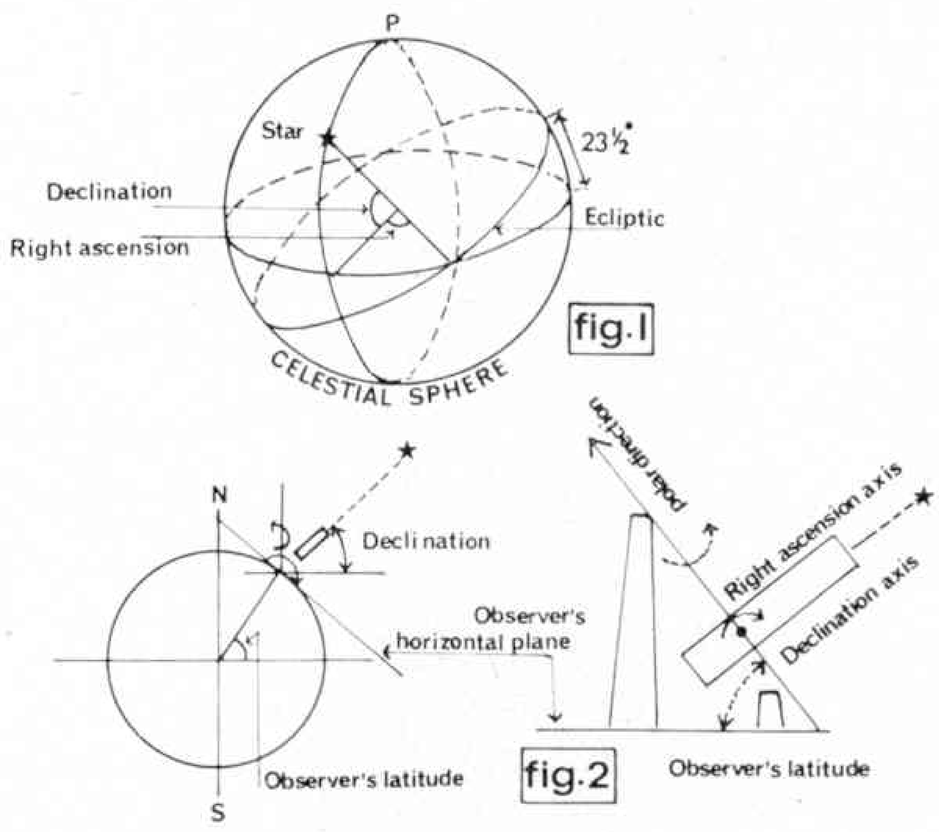
Most wonderful to sightseers is the huge 210 foot diameter parabolic 'dish' with its 'trellis work', presenting a symmetry of true geometrical shape. This, in reality, is the 'ear' of the telescope which can be accurately pointed to collect radiation from an astronomical body anywhere in the sky. Like an optical telescope, it can be made to follow the body automatically in its daily rising and setting. Instead of a mirror, the wire screen or 'trellis', which forms the dish, focuses the radio waves, which are received and made audible by means of radio receivers.

As everyone knows, a radio telescope is used for the purpose of studying radio astronomy, the science dealing with heavenly bodies including the sun, moon, planets and stars. A radio telescope can be thought of as a huge TV receiver. There is an aerial, usually saucer-shaped, to gather in the cosmic signals and a receiver to pick up and amplify them. The operator sees rather than hears, the final record being a series of lines traced on a graph by a recording instrument. The U.S. Navy's massive 600-foot paraboloid dish, weighing some 20,000 tons, was completed in 1962, and both Cornell University and the U.S. National Radio Astronomy Observatory have proposed a 1,000-foot receiver.

The graphs produced vary a good deal according to the heavenly body 'listened to' and other factors. The planet of Jupiter has attracted much attention during recent months because of its slightly nearer position to Earth. Astronomers speak of 'light years away or distant', so that the statement '6,000,000,000 light years away' implies that the star or point of light looked at or seen started on its journey to earth 6,000,000,000 light years ago. In other words, one would be looking back 6,000,000,000 light years in the past.

Australia's radio telescope is the second largest steerable instrument in the world, the huge dish being mounted altazimuth fashion like a naval gun or theodolite, on a 40-foot high concrete tower. The basic components of the mounting are the turret, which rotates in azimuth on a 37 feet 6 inches diameter roller path and the hub of the dish, with its hammerhead altitude counterweights, which rotates on the turret in altitude, the counterweights passing inside the yoke of the turret.

Altogether, there is nearly 200 tons of steelwork in the huge dish and a further 150 tons in the mounting. The total weight on the azimuth track is 800 tons, of which 400 tons is



The position of celestial objects is defined in terms of a latitude-longitude system of co-ordinates in which all objects are assumed to lie on the surface of a sphere (see Fig. 1) of large but not infinite radius whose centre is the earth. The equatorial plane and polar directions are taken as those of the earth produced to meet the surface of the sphere.
It will be apparent from Fig. 1, that to an observer situated on a plane parallel to the equator, a fixed star will appear to change in azimuth only. This fact is used in the design of mounts for all optical telescopes which greatly simplifies the problem of observing fixed objects in that, once the axis of the telescope has been aligned to the angle of declination, it need only be driven at the same rate and in the opposite direction to the earth's rotation in the right ascension plane. (see Fig. 2).

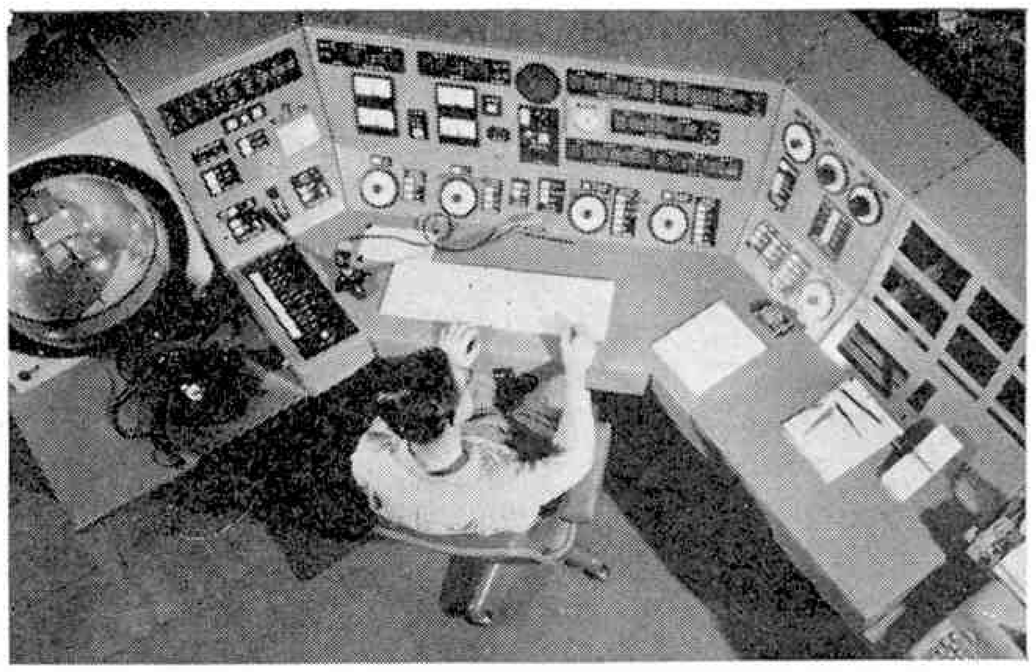
accounted for by counterweight ballast. The instrument is driven in both motions through precision gearboxes powered by DC electric motors under servo control. It can point in any direction from the zenith, directly overhead, to within 30 degrees of the horizon.

A novel feature of the instrument is the way it is controlled in the equatorial co-ordinates of declination and right ascension essential for astronomical purposes. This is done by a small equatorially mounted master unit placed at the centre of motion of the telescope on an independent pillar which passes right through the main lateral bearing down to an independent foundation.

The master unit, which is light and easily moved, is capable of extremely accurate control and, guided by a photo-electric device mounted on the hub which detects any lack of alignment between itself and the master unit, the radio telescope follows it. This device also feeds proportional error signals into the servo control system. With a reflector surface accuracy of $\pm\frac{1}{4}$ inch from the normal paraboloid in the zenith position, and $\pm\frac{1}{2}$ inch from the best-fitting paraboloid at any altitude, it operates in wind speeds of up to 30 miles-an-hour, with an overall pointing accuracy better than 90 secs. of arc. In the stowed position it is designed to withstand winds of 100 m.p.h.

The dish is formed by 30 cantilever truss ribs radiating from a 23 foot diameter central hub, which are half-crescent shaped, 19 feet deep at the root, and the top chords curved approximately to the parabolic form of the reflector. Outside the central plated portion, the reflecting surface is formed from small panels of square mesh of 100 ton tensile steel wire galvanized after weaving. Such a surface is highly efficient for reflecting the 21 cm. radio waves for which the radio telescope was designed.

The 100 foot long legs of the aerial tripod, which emerge from the three ribs of the dish are of welded tubular construction, with trapezoidal cross-section. They are pin ended



This small console controls the radio telescope

at the foot, and at the apex are built into the steel-plated cabin where the radio receiving equipment is housed. On the underside of the cabin is an adjustable platform which carries the aerials or feeds.

Although physically a part of the dish, the hub is mechanically a part of the mounting and it is the two machined rims of the hub where the rib chords are attached which form the real boundary of the dish steelwork. Again, the layout required the azimuth track to be supported at some height above ground and this was simply effected by means of a cylindrical tower of reinforced concrete. To support the 40-foot mild steel pillar carrying the master equatorial control unit, a structurally separate inner tower was needed.

As already mentioned, the hub is a cylinder of mild steel plate about 20 feet deep and 23 feet in diameter, machined accurately circular around the top and bottom rims. In the space between the counterweights is a light, plated structure, the turret tower, which serves the purpose of enclosing the master equatorial unit. A spiral staircase inside the master equatorial pillar gives access from the concrete supporting tower to the turret access tower.

On the upper floor of the tower is the control room which houses most of the electronic equipment associated with the servo-system as well as a control console. Radio receiving equipment is housed on the floor below, as well as inside the hub and in the aerial cabin at the focus.

The control system provides three methods of operation: (1) One in which the dish is driven about an axis parallel with the earth's polar axis at the desired angles of declination when pointing at a distant star (siderial rate). (2) Automatic scanning of sectors of the sky in either equatorial or altazimuth co-ordinates. (3) Manual control of the telescope about a vertical and horizontal axis for preliminary target acquisition, stowing and following local objects.

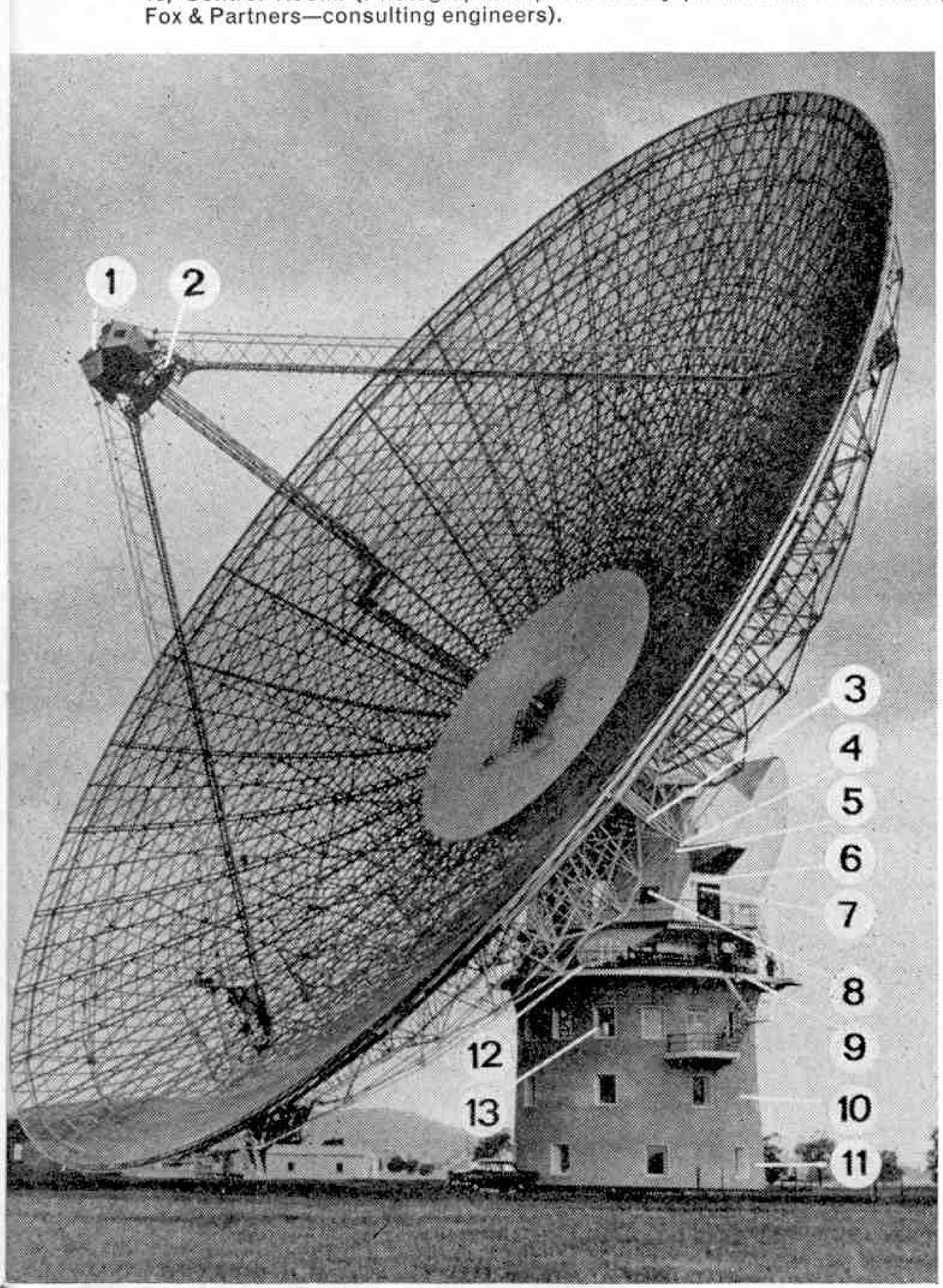
Its chief use is for radio astronomy, i.e.: (1) Observation of fixed radio sources. (2) Scanning particular areas of the sky in order to prepare radio intensity maps, there being no intention of using it for satellite tracking since its speed is too slow. However, it may be used to track deep space probes later as speed requirements for these are not too severe.

A pre-requisite of steerable radio telescopes is a very large and mechanically rigid reflector and it is because of the enormous sizes and weights involved that they are mounted such that their rotational axes are in and perpendicular to the horizontal plane. This is known as the altazimuth method of mounting. Some form of computer is then necessary to perform the complex calculations needed to obtain the required azimuth and elevation angles of the telescope given the right ascension, declination, time and precession. The latter term is included because the earth's polar axis is performing a slow conical motion about the ecliptic with the result that astronomical objects change their position relative to the earth.

Australia's radio telescope has been in operation since 1961. often for long periods almost round-the-clock.

Charles Rigby

Positions of the various controls of the telescope. 1, Aerial Cabin. 2, Aerial Platform. 3, Vertex Room. 4, Hub Room. 5, Master Equatorial Room. 6, Altitude Bearings. 7, Turret Access. 8, Turret Radio Room. 9, Roller Track. 10, Tower Radio Room. 11, Store. 12, Motor Room. 13, Control Room. (Photographs reproduced by permission of Freeman, Fox & Partners—consulting engineers).



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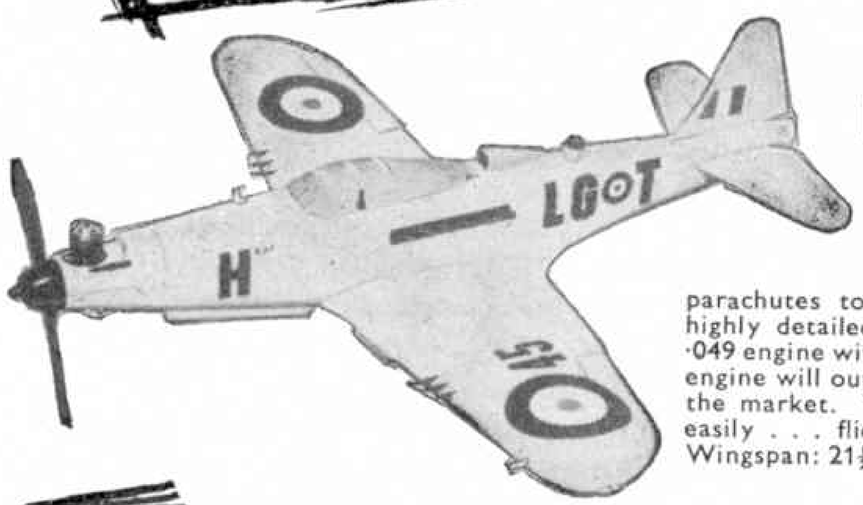
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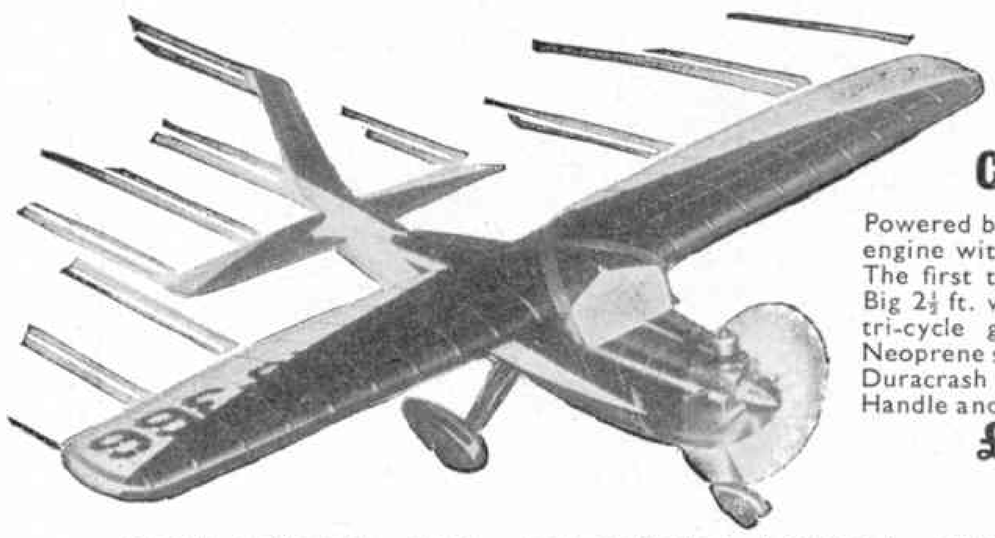
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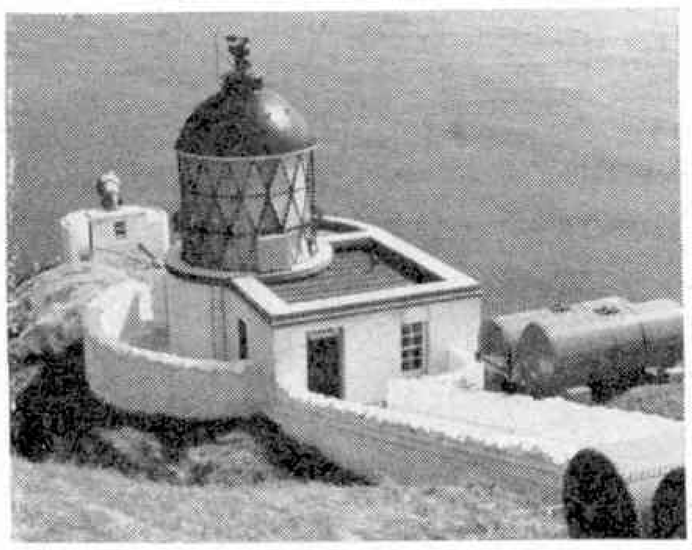
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mailbag

Anything interesting . . . write about it to the editor

DOWN TO THE LIGHTHOUSE—St. Abb's Head lighthouse is situated on a promontory on the south-east coast of Scotland between the town of Berwick-on Tweed and Dunbar. The lighthouse is 224 feet above the waves and its light flashes every ten seconds. The beam can be seen, under normal conditions, for about 20 miles.

To my mind however, the most interesting thing about this lighthouse is that you walk



DOWN steps to the light and not up as in the normal type of lighthouse. The reason for this is that the keepers' quarters are even higher above sea level than the actual lighthouse.

The photograph shows the St. Abb's Head lighthouse and the foghorn, which is lower than the lamp itself.—*J. D. McDonald, Aberdour, Fife.*

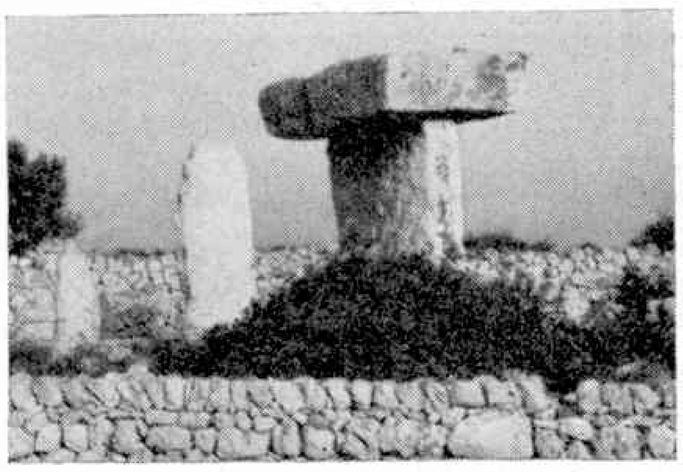
ANCIENT MONUMENTS—Everyone is familiar with Stonehenge, either from personal visits, or from studying photographs and reading articles. Because it is so famous, we tend to forget that other countries have their links with the megalithic builders of past centuries. This is particularly so of the countries and islands of the Mediterranean area. The islands of Sardinia and Minorca have monuments dating from the Bronze Age. There are two different relics which are known as TALAIOTS and TAULAS.

TALAIOTS are round, stone structures, with an interior which was obviously designed for habitation. On Minorca there are approximately 500 of these buildings, and it is generally assumed by archaeologists that they may have been erected in the centre of each village. If that was so, there must have been a great many more villages in the Bronze Age than there are today.



The TAULAS are large blocks of vertical stones, with a large capping stone placed on the top, to form a letter 'T'. These are also regarded as monuments, and the capping stones of some have been measured as being over 12 feet in length. By calculation they must weigh several tons. There are more than 50 on Minorca. Where a TAULAS has appeared to be in danger of collapsing, a concrete plinth has been erected on the weakest side.

How the capping stones were raised on to their upright supporting stone is not



known. There is no doubt that eventually the archaeologists will discover the method by which the structure was erected, without the aid of lifting tackle as we know it today, just as they have discovered how the gigantic stone figures on Easter Island were raised into upright positions.

The TAULAS are also surrounded by a circle of vertical stones, and again it is assumed that they were used for pagan ceremonies.

Whatever purpose these ancient monuments, were for, they have left a problem which has not yet been fully solved.—*Arnold Holt, Manchester, 9.*

DOUBLE-HEADED TRAIN—A sight which can only be seen during the summer months on the Isle of Wight is the double-headed steam train which runs from Ryde Pier Head Station to Sandown, Shanklin and Ventnor.

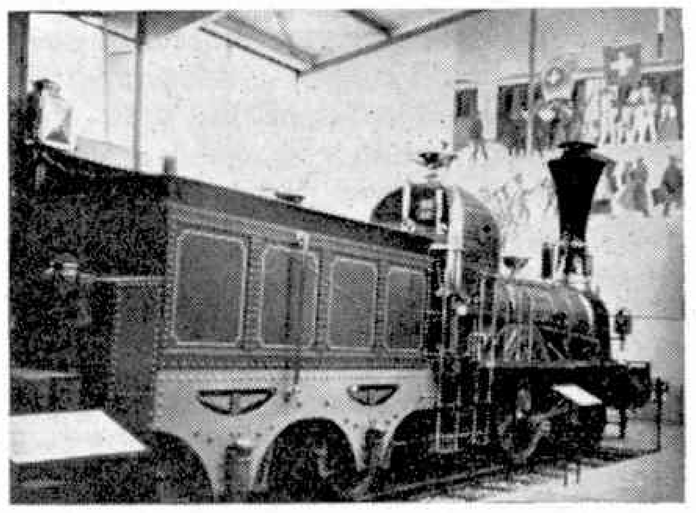
The double-heading is only necessary in



the summer months when the amount of mail, luggage and parcels increases due to the holiday season. The photograph was taken at a point just north of Smallbrook Junction, Ryde, and in this particular instance, the mail coaches were attached to the rear of the passenger coaches.—*K. Parkes, Ryde, I-o-W.*

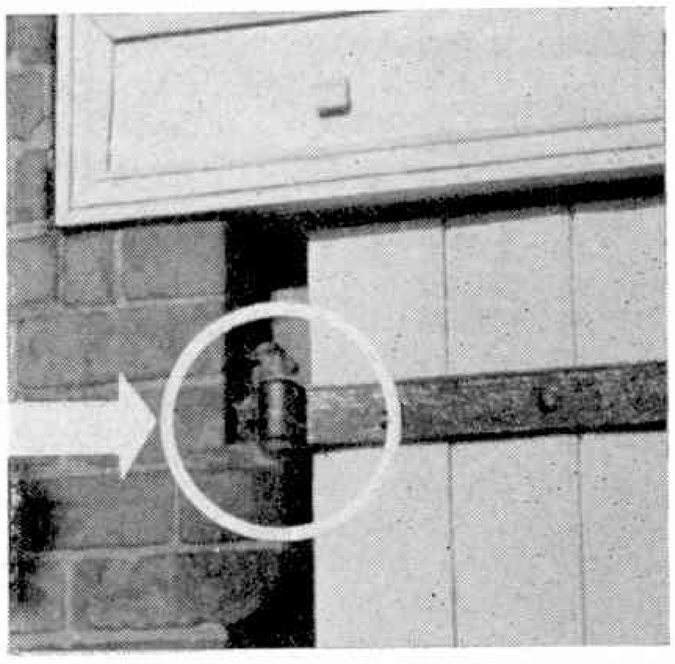
THE GOTTHARD LINE—During a holiday to Italy and Switzerland, I travelled on the steeply gradiented Gotthard main line of the Swiss Federal Railways. The line is worked mainly by the Ae 6/6 type 6,000 h.p. Co-Co electric locomotives which were first introduced in 1953.

At Lucerne an interesting exhibit in the Transport Museum is an HO gauge working model railway, portraying a section of the Gotthard line. There are also many other very interesting exhibits, including a locomotive of the 'Spanisch-Brötli-Bahn', the first Swiss railway built in 1847. A photograph of this historic engine is enclosed.—*G. Hounsell, Trowbridge, Wilts.*



WATCH THE BIRDIE—Here is an unusual photograph, taken with an ordinary camera, of a flycatcher on its nest behind the hinge of a garage door.

It was a long time before this nest was noticed. The birds were little disturbed and it became possible to approach to within a couple of yards. The picture was taken from the top of some steps.—*V. C. Chamberlain, Bath.*



by **Paul Dong**

IN CLOSE UP

CLOSE-UP photography is not as expensive or difficult as some people imagine and, what is more important, you don't need an expensive camera.

If your camera has any provision for focusing you will see that as the subject is moved nearer the camera, the lens goes forward to meet it. The problem with many cameras is that the lens cannot be moved very far and the nearest point in focus is usually about 3 ft. away.

Plate cameras normally have double or triple extension, that is the baseboard has a means of extending to increase the movement of the lens and so permit photography of near subjects. Some single lens reflex cameras have removable lenses and here you can fit extension tubes to give the same effect.

With other cameras, you have to use close-up lenses which shorten the effective focal length of the camera lens fitted and so give the effect of an extra extension. It sounds rather complicated, but instead of explaining the theory of the matter, which will take valuable time and space, I will go straight on with the practical side which will enable you to take close-up pictures with any camera.

The power of close-up lenses is expressed in dioptres, one dioptre is the weakest and three dioptres the strongest.

If you are just beginning close-up photography, your best buy will be the two dioptre lens, which is a good average and will tell you whether you need a stronger or weaker lens for your type of work. These lenses are held on to the front of the camera either in the mount you use for filters, or in the lens hood, depending on your equipment. Least expensive are those made by Actina or Photo Science, which cost from 7s. 6d. to 10s. 0d., according to the diameter required to fit your camera. There are more expensive types on the market made for specific cameras which cost several pounds each, but the difference in quality of the finished result is very slight indeed.

The main advantage of buying the expensive types is for the owners of twin-lens reflex cameras, such as the Rolliflex. Their close-up lenses have a built-in method of correcting parallax, a problem we will come to later.

If you own a twin-lens reflex, but do not wish to spend a vast sum of money on lenses, you can use the cheaper lens but you will need two, one for each lens of the camera, and you must buy them as a 'matched pair'. It will cost two or three shillings more, but as the lenses are made as economically as possible, they do not always match. If you try to use odd ones, you may find that they do not focus together, so giving you unsharp pictures.

If your camera is fitted with a focusing screen, you focus in the normal way with the close-up lens in position. If not, you should be at 14 in. and the camera focusing at 3 ft. the subject at 12 in.

These figures vary from lens to lens, so if the figures given here are different to those on your leaflet, don't worry, the leaflet is correct.

These distances must be measured accurately, normally from the front of the camera, i.e. the lens position, because there is very little depth of focus close-up. For the same reason it is best to work at the smallest aperture possible in order to obtain maximum sharpness.

Another important point is camera rigidity. Working so close to the subject, accuracy is very necessary, so you want to avoid any movement of the camera after setting it up and during exposure. As most of your close-up work will be done indoors, some long exposures may be necessary.

If you have no suitable tripod, you can quite easily make a wood or metal jig to hold the camera. The tripod bush in the bottom of the camera is either $\frac{1}{4}$ or $\frac{3}{8}$ in. Whitworth thread, so if you cannot get a suitable retaining screw from a photographic shop, you can get ordinary bolts of that type from an ironmonger.

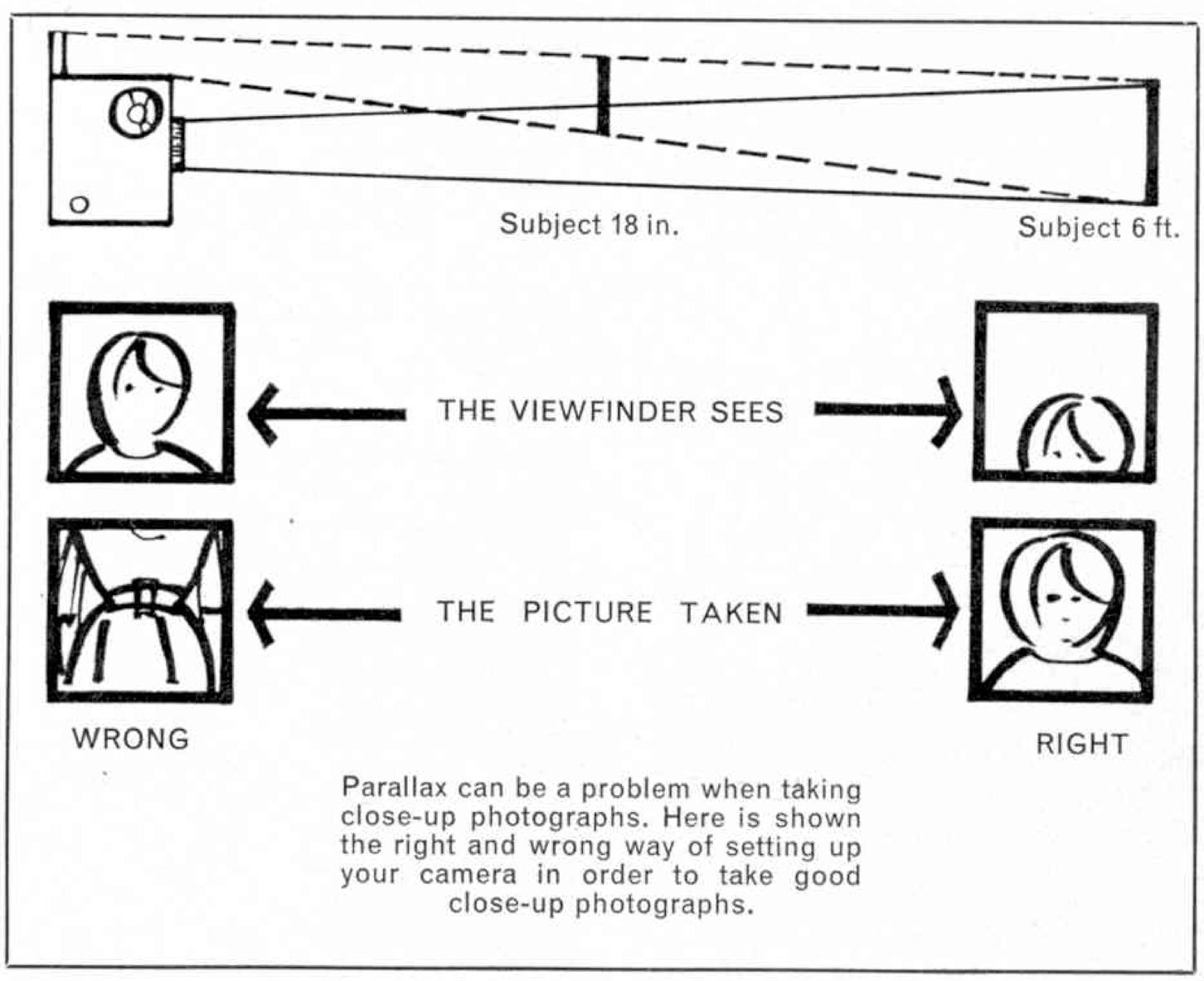
Exposure should be calculated in the normal way, giving an additional stop, i.e. doubling the exposure, when using extension tubes or double extension at 12 in. or less. Close-up lenses do not need any increase in exposure.

The main problem is parallax, which is due to the viewfinder being separate from the lens. This is not applicable to single lens reflex cameras and plate cameras with a focusing screen, both of which use the taking lens for viewing.

In the twin-lens reflex it can be cured by using the more expensive lenses already mentioned which will correct it. But for the majority of photographers it is a matter of careful use of the camera.

The diagrams show how the problem arises, with the viewfinder showing a different picture to the taking lens. One simple cure is to set up the subject normally in the viewfinder and, when everything is set to take the picture, you just lift the camera, or move it sideways if the viewfinder is on the side, so that the taking lens is in the position previously occupied by the viewfinder. You can find out how much to move it by measuring the distance between the centre of the lens and the viewfinder. If you are handy, you could make up a sliding jig to make the job simpler.

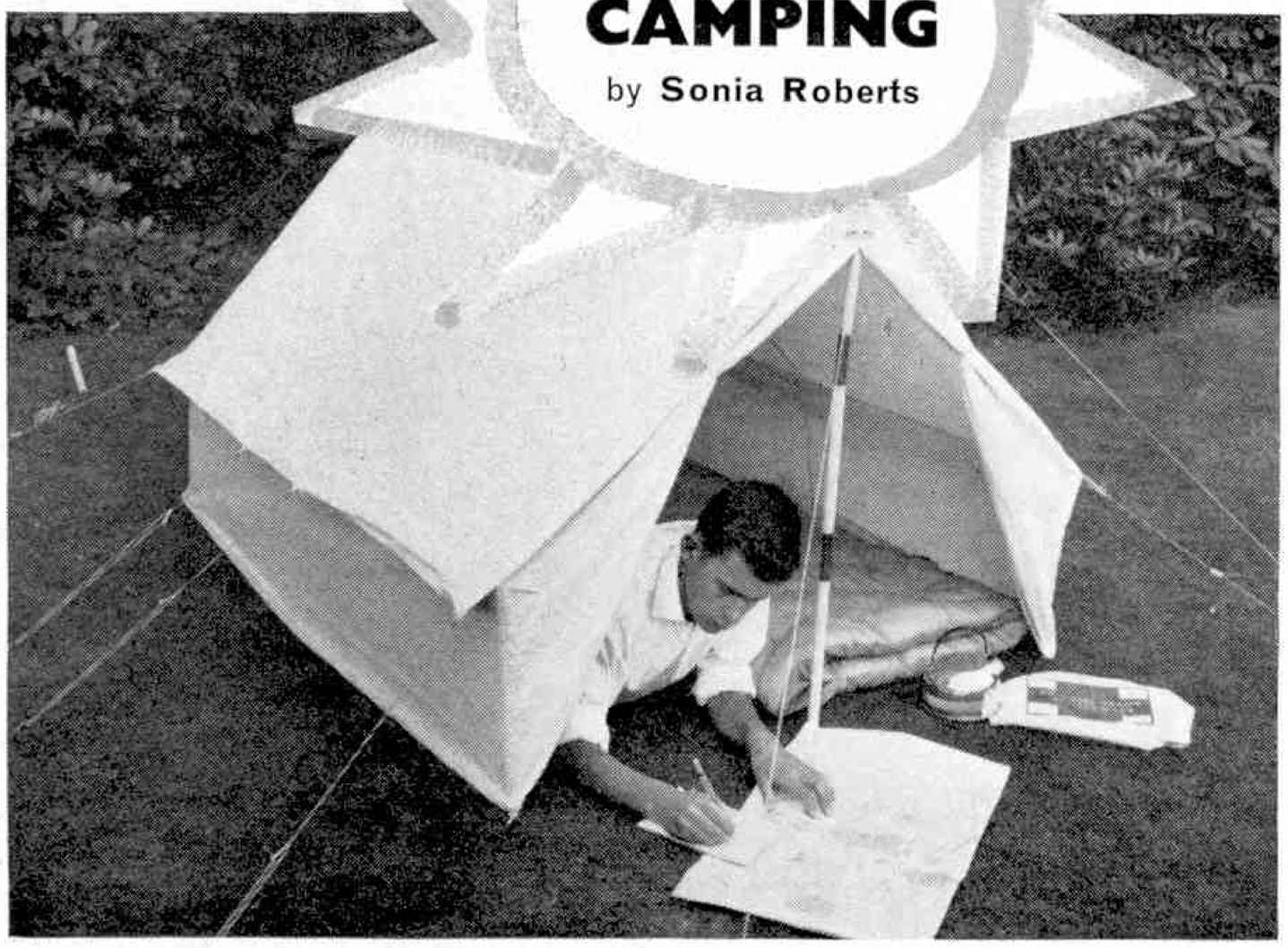
When you have done this, check the distance of the subject to make sure that you have not moved the camera forwards or backwards and so thrown the subject out of focus. Using the methods explained here, you can easily take close-up photographs of your models.



Parallax can be a problem when taking close-up photographs. Here is shown the right and wrong way of setting up your camera in order to take good close-up photographs.

GOING CAMPING

by **Sonia Roberts**



ARE you considering camping this year? If so, now is the time to start planning your trip. The first signs of spring are sufficient to set most people thinking they fancy the simple outdoor life, but there is a big gap between this mood and the serious preparations which are necessary for a really successful holiday under canvas.

The gear you will need will depend very much on the means you are using to get to the camp site and the geography of the camp site itself.

For example, if you are walking, you will need to travel lighter than if you cycle. If someone is dropping you off from a car and collecting you at the end of the stay, you can afford space for more complex equipment.

Camping with friends of one's own age can be the best fun of all. It is wonderful to feel free and independent, but you have to remember that you will be living very close together, so it will be a very real test of comradeship.

You will also have to take a fair share of the unpleasant jobs, as well as the adventure of camp life, without a grumble. For, although it is fun to fry chips over an open fire, remember at camp there will be no mum to peel the potatoes or wash the pan.

Also, tidiness is a must in a crowded tent. Unless you are prepared to stow your possessions away neatly each night before you settle snugly in your sleeping bag, you may not have room to put a bed down at all.

For sleeping in a tent, a good ground sheet is essential. Sleeping directly on the ground is a basic mistake. It not only ruins the comfort, but sometimes the health of many novice campers.

Groundsheets are fitted with brass eyelets through which they can be pegged firmly into position as soon as the tent is in place. Second-hand ground sheets, or new groundsheets used for a second time, should always be tested by pouring a bucket of water into them and care must be taken not to puncture the sheet by walking over it with heavy boots.

Travel comfortably.

You don't need an expensive wardrobe to camp—and you must exercise some commonsense about weather—neither wrapping yourselves from head to toe in woollens for the summer or shorts and singlet only with snow on the ground. Anywhere in England a mackintosh or fully-proofed anorak is a must. These outdoor jackets have plenty of pockets to stow small items which cannot be packed into the rucksack.

Never load yourself down so heavily that you cannot travel in comfort. Many items can be improvised on the camp site and learning to use local materials to improve the comfort of your outpost is all part of the pleasure of this sport. In forthcoming articles, we shall be going into the campers' needs for various types of holiday and camp site in detail.

Once at camp, we are free of most of the rules and regulations which restrict us at home or school. However, the few rules which do remain have to be obeyed implicitly, because those who break the country code can be literally endangering lives—their own and other people's.

This is why at a first camp, it is always helpful to have a camp leader—a grown-up or big brother who has had some previous experience of camping to guide you in the ways of the outdoor world.

The camper who wants to live off the land, as far as possible, must recognise that fields of potatoes, onions and fruit, are not there for his benefit; they are as carefully planted private property as the flowers in his garden at home. He should not rely on being able to buy milk, eggs and butter at the farm, but should carry emergency rations with him and should know sufficient about plants for his own protection as not to confuse a field mushroom with a toadstool.

He must seek out a suitable place for pitching the tent, never on the edge of a cliff, or in the bed of a dried-up river, which might, if a sudden storm occurred, become liquid again in seconds.

No one should launch themselves straight into the outdoor life without some practice at pitching a tent and cooking their own food. It is a good idea, some months before you plan the actual holiday, to borrow a tent from an experienced camper chum and set it up in the back garden at week-ends.

A trial run.

As the date of the real trip draws near, travel to a site a few miles from home and repeat the experience you have gained in back garden camping.

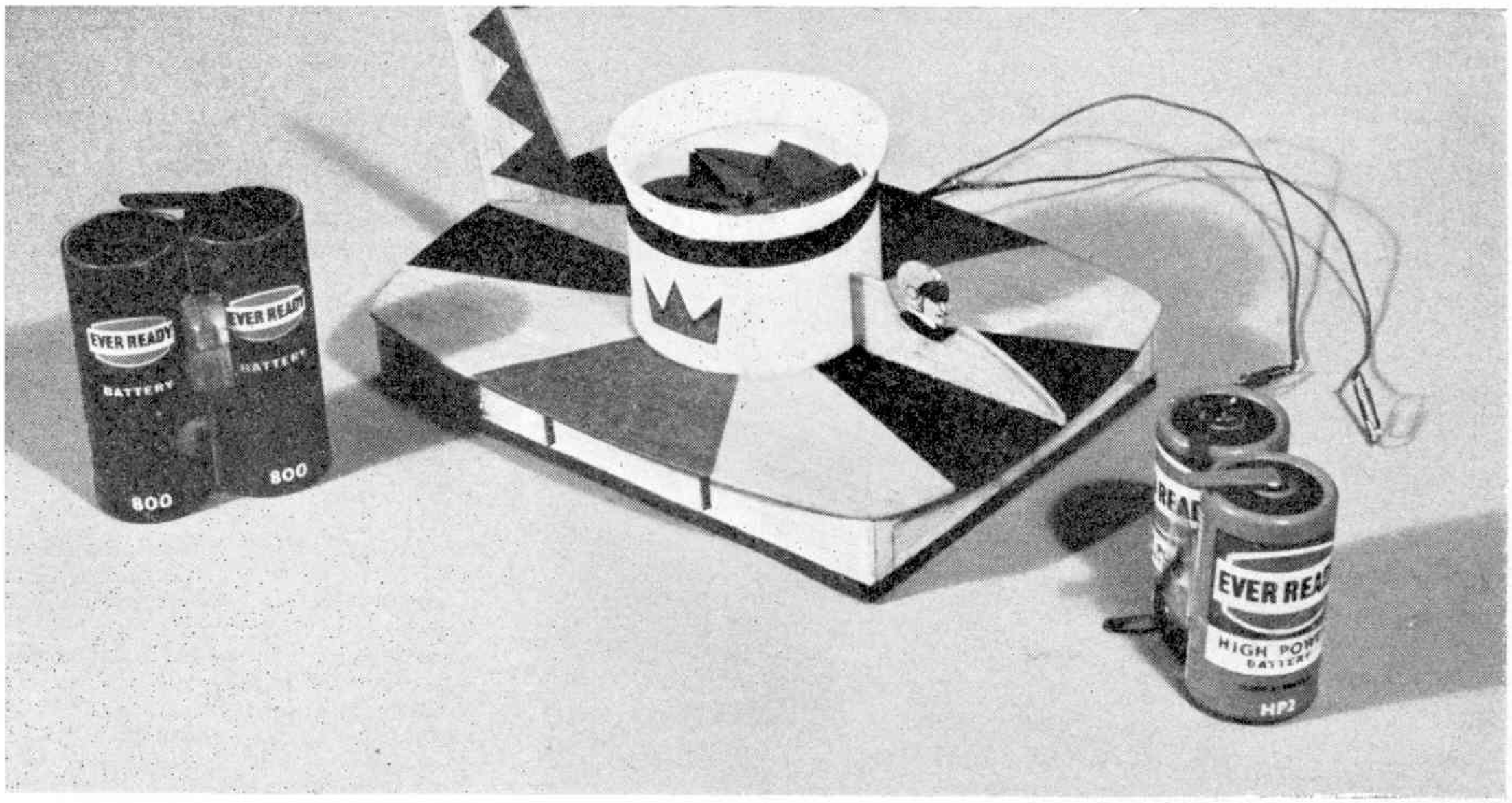
Always leave the folks back home some indication of the area in which you plan to camp in case of emergency. Also, if it is your first camping trip, it is a thoughtful gesture to drop a line to parents and relatives who might otherwise be worrying about your welfare.

It is a good plan before you set off on your camping trip to become a member of the Youth Hostels Association, so that if the weather is so bad that it is impossible for you to use your camping equipment you still have a place to stay at a price you can afford. Youth hostels charge 3 shillings for a bed, 2s. 6d. for a meal, and if you cook you own food the charge is less.

Charges for youth hostel membership per year are 5 shillings from 6 to 16 years, 10 shillings between 16 and 21. The organization can also help you to obtain clothing and equipment at reasonable rates and publishes a number of useful guide books such as their Europa Camping Guide which comes out each April and lists 2,000 suitable sites in Europe and North Africa. It costs 16 shillings. Write to the: *Youth Hostels Association, 29 John Adam St., London, W.C.1.*

Another useful organisation is *The Camping Club of Great Britain.* Write to them at: 11 *Grosvenor Place, London, S.W.1,* for details of their facilities, books and courses.

You cannot learn too much about camping and your spare time between your decision to camp and your trip, should be spent reading books on the subject, which you can get from your local public library.



"HOVERFLY"

Build your own Hovercraft from these plans and instructions by Ray Malmström

HOVERCRAFT, or to give them their correct name, 'air cushion vehicles', fascinate most people, but not many of us have had the opportunity of seeing the real thing in action. If you build 'Hoverfly' you will provide hours of entertainment for yourself, as well as attracting a lot of attention wherever you demonstrate it. The 'Hoverfly', full size plans for which are given in this article, is powered by a small electric motor and operates by wires attached to a battery held in the hand. Construction is not difficult, just work slowly and accurately and you'll soon be carrying out your first hovering tests!

Lightness is very important. so choose *medium* grade balsa for your Hoverfly (medium grade balsa is often coloured green on the ends of the sheets. Check at your hobby shop.) Refer to the 'easy-build' sketches and start by joining two lengths of 3 in. wide by $\frac{1}{16}$ in. sheet and then cut out the top deck. Note the position of the centre hole, then add the four sides as shown.

Construct the lower deck in the same way. Cut out $\frac{1}{16}$ ply motor mounts (A-B). When cemented in place, anchor mounts firmly by cementing pieces of silk or tape underneath. Note the small hole in the centre of the lower deck. Add pieces C-D as shown.

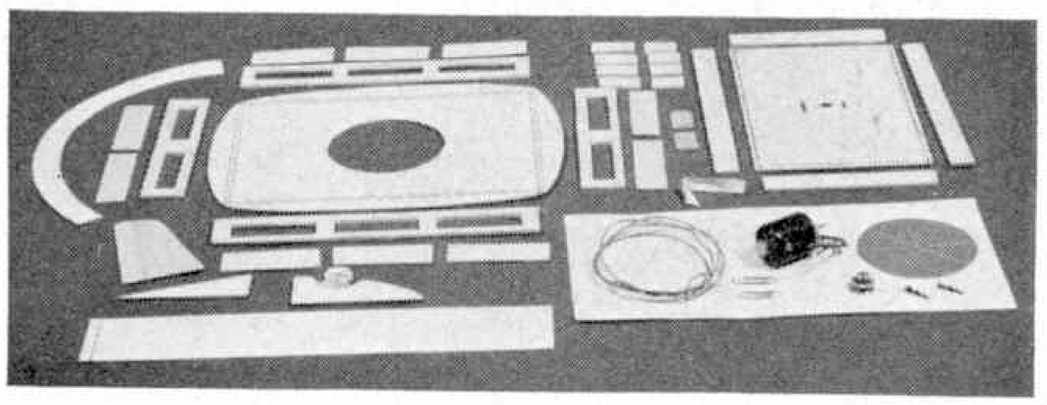
Mount the motor by means of a screw and tight rubber band. The motor, which is supplied with a metal mount which must be removed before installation, is an 'ORBIT' 205, price 4s. 4d. Obtain it from your local hobby stores or write direct, enclosing P.O. 4s. 10d. to: *Ripmax, 39 Parkway, Camden Town, London, N.W.*1.

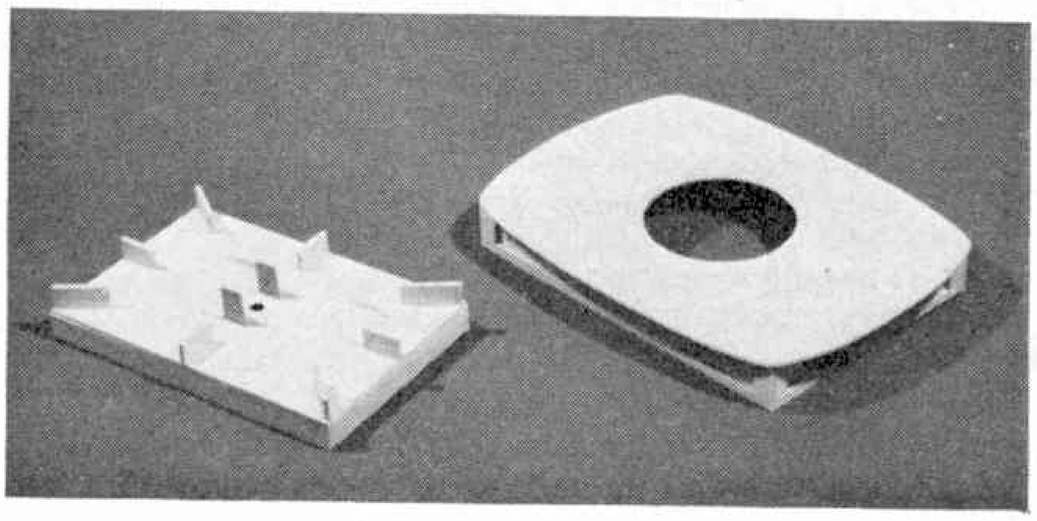
Now the important stage of cementing the lower deck box inside the top deck box. The eight pieces C and D are firmly cemented to the underside of the top deck. Make sure the motor is centrally positioned in the cut out in the top deck. Cut out the fan from thin tin. Holes should be bored in the centre of the fan to take 10BA bolts. Now take a $\frac{1}{2}$ in. diameter plastic pulley (from model stores, approximately 1s. 0d.) and drill it *carefully* as shown. You'll need a small vice.

Take the fan and bend the blades to an angle of about 15 degrees. Make sure each blade is at the same angle otherwise vibration and power-loss will result. Bolt the pulley to the back of the fan with two 10BA nuts and bolts. Mount fan and pulley on motor drive shaft and tighten pulley grub-screw.

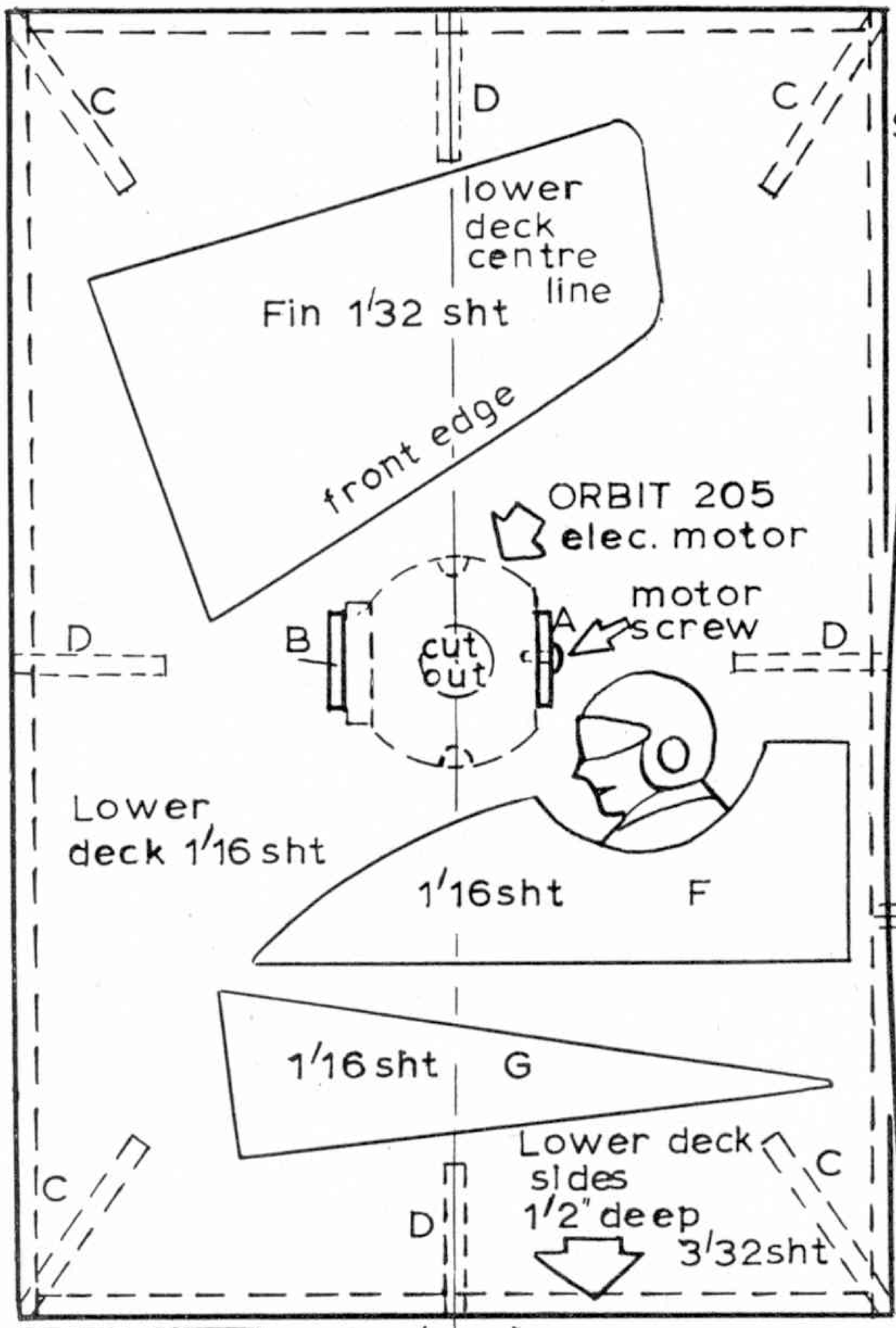
If the pulley and the fan are loose on the shaft, wind a $\frac{1}{4}$ in. strip of Sellotape around the shaft. This will make the pulley a snug fit. Position the electric motor leads on the top deck as shown. Use dope or cement for the tissue strips and make the funnel from thin card. Note small cut-out for motor leads. Cement funnel accurately in place. The funnel top can be made from thin notepaper.

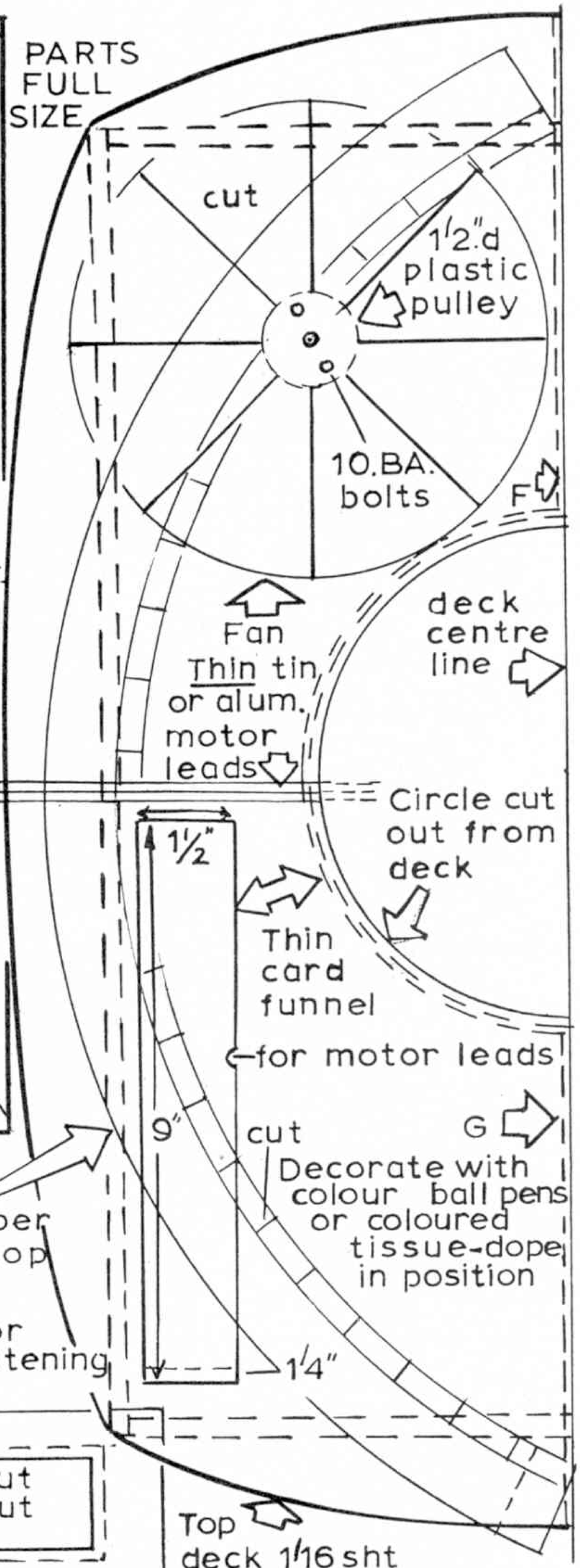
Add pieces F and G and the fin and finally decorate as suggested on the plan. Purchase a few feet of enamelled copper wire (about 30-36 gauge) and connect two lengths of it to the motor leads. Attach two paper clips on the other



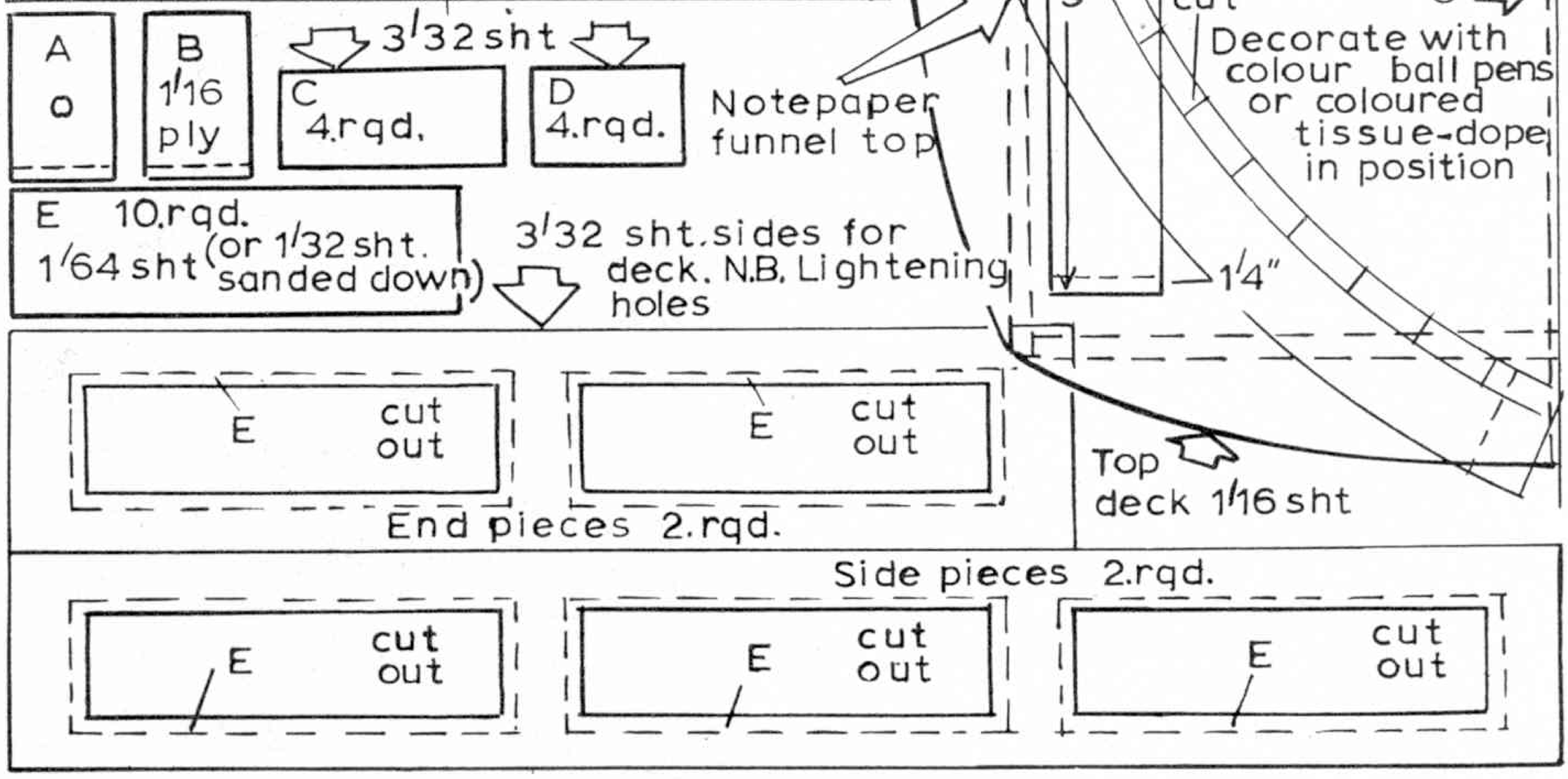


Above: All parts for the Hoverfly, including electric motor, ready for assembly. *Below:* Lower deck (left) ready for motor installation. The top deck is shown complete on the right


C
D
C
lower deck centre line
Fin 1/32 sht
front edge
ORBIT 205 elec. motor
motor screw
B
cut out
A
D
D
Lower deck 1/16 sht
1/16sht F
1/16 sht G
C
D
C
Lower deck sides 1/2" deep
3/32sht


PARTS FULL SIZE
cut
1/2"d plastic pulley
10.BA. bolts
F
Fan
Thin tin or alum. motor leads
deck centre line
Circle cut out from deck
1/2"
Thin card funnel
for motor leads
9"
cut
G
Decorate with colour ball pens or coloured tissue-dope in position
1/4"
Top deck 1/16 sht

A
0
B
1/16
ply
3/32 sht
C
4.rqd.
D
4.rqd.
Notepaper funnel top
E 10.rqd.
1/64 sht (or 1/32 sht. sanded down)
3/32 sht. sides for deck. N.B. Lightening holes


E
cut out
E
cut out
End pieces 2.rqd.
E
cut out
E
cut out
E
cut out
Side pieces 2.rqd.

ends. Remove the enamel for a good electrical contact.

We found the best batteries were two Ever Ready HP.2 ($1\frac{1}{2}$ volts each) connected in series to give 3 volts. Two small brass lugs soldered to the battery assists the slipping on of the paper clips.

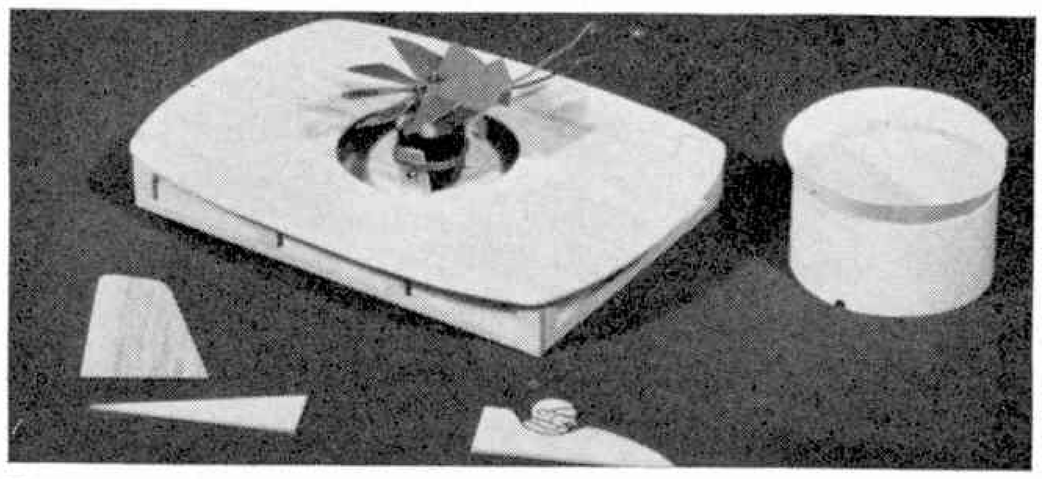
You are now ready for the first 'hover' test. If your 'Hoverfly' will not hover on an even keel, add *tiny* pieces of Plasticene under the rim of the top deck. You'll soon get the balance correct. Vibration is caused by irregular blade angles.

By altering the blade angles slightly, you will obtain the best hovering height. Hover-height depends on the right blade angle *and* good batteries, but it should be $\frac{1}{8}$ to $\frac{3}{16}$ of an inch.

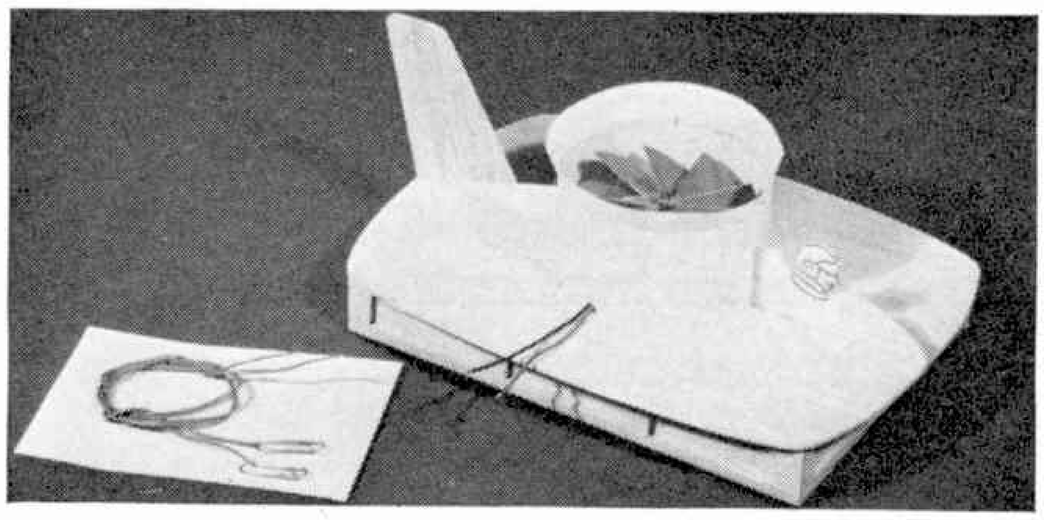
Hoverfly is not intended for water operations. A little extra weight in the front gives forward movement. Using exactly the same principle as the full-size air cushion vehicles, we know you are going to find Hoverfly exciting to operate.

Materials Required

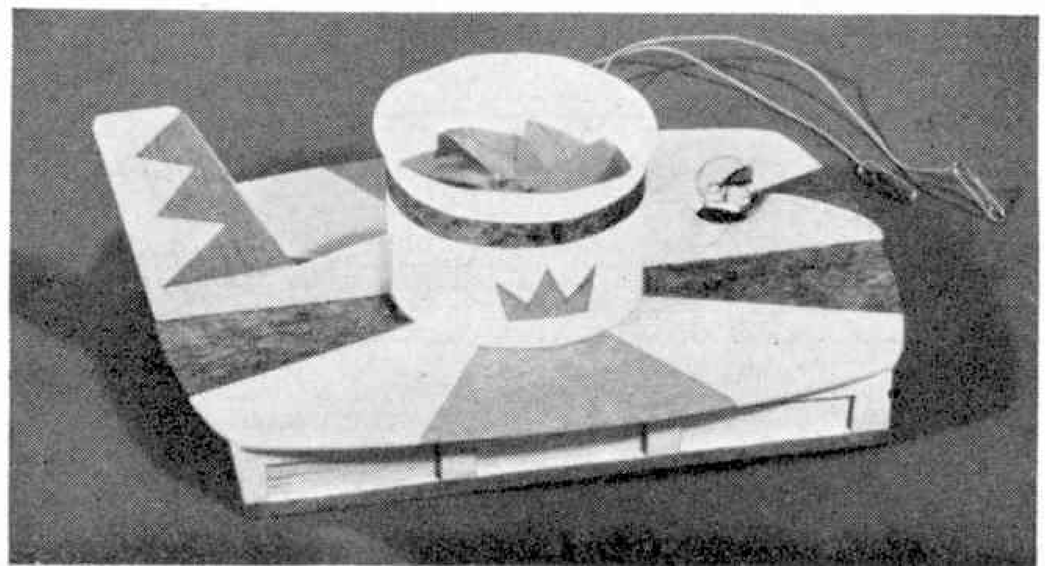
1 sheet $\frac{1}{16}$ by 3 by 36 in. balsawood
1 sheet $\frac{3}{32}$ by 3 by 18 in. balsawood.
1 piece $\frac{1}{64}$ or $\frac{1}{32}$ by 3 in. balsawood.
1 piece (3 in. square) thin tin.
1 "ORBIT" 205 $1\frac{1}{2}$-3v. electric motor.
1 $\frac{1}{2}$ in. diameter plastic pulley.
2 10BA nuts and bolts.
1 small piece linen tape or silk $\frac{1}{4}$ in. wide.
Sheet of tissue (model aircraft variety. Lightweight).
4 feet of enamelled copper wire (30-36 gauge approx.).
2 paper clips.
2 Ever Ready HP.2 $1\frac{1}{2}$v. batteries.
Tube of balsa cement.
Pieces of thin card and notepaper.
Rubber band.
Small bottle of clear dope.



Electric motor and fan in position, with lower deck cemented to top



Above: Ready for decoration. *Below:* Simple designs are best





Have you a problem—in science, history, literature or any other subject—to which you cannot find the answer?
Ask Tom Sheridan and he will do his best to answer it. If he cannot, and he thinks one of our readers might be able to help, he will print your query in this feature. Questions should be sent on postcards bearing your full name and address (but these will not be published if you put them in brackets and just add your initials or a pen name). Address them to Tom Sheridan, *Meccano Magazine*, Thomas Skinner and Co. (Publishers) Ltd., St Alphage House, Fore Street, London, E.C.2.
You may submit as many questions as you like. We will deal with as many as possible each issue.

Chess Player

Q. *What can you tell me about Von Kempelen's Chess Player?—T.G., Hastings.*

A. This was a famous illusion, created by Baron Wolfgang von Kempelen in 1769. The figure of an Eastern sultan, less than man-sized, sat at a boxed-in table and played games of chess as though worked by machinery. After defeating many famous people in Europe, the Chess Player was bought by J. N. Maelzel, a Bavarian showman, and travelled the world taking on other challengers. It was in America that its secret was discovered by the writer Edgar Allan Poe, who realised that the figure's left arm was worked by an expert chess player hidden inside the cabinet, who was also able to conceal himself behind the "mechanism" when it was revealed to the audience.

Old Crock

Q. *What was the name of the first motor car?—T. D. Mead, Midsomer Norton, Somerset.*

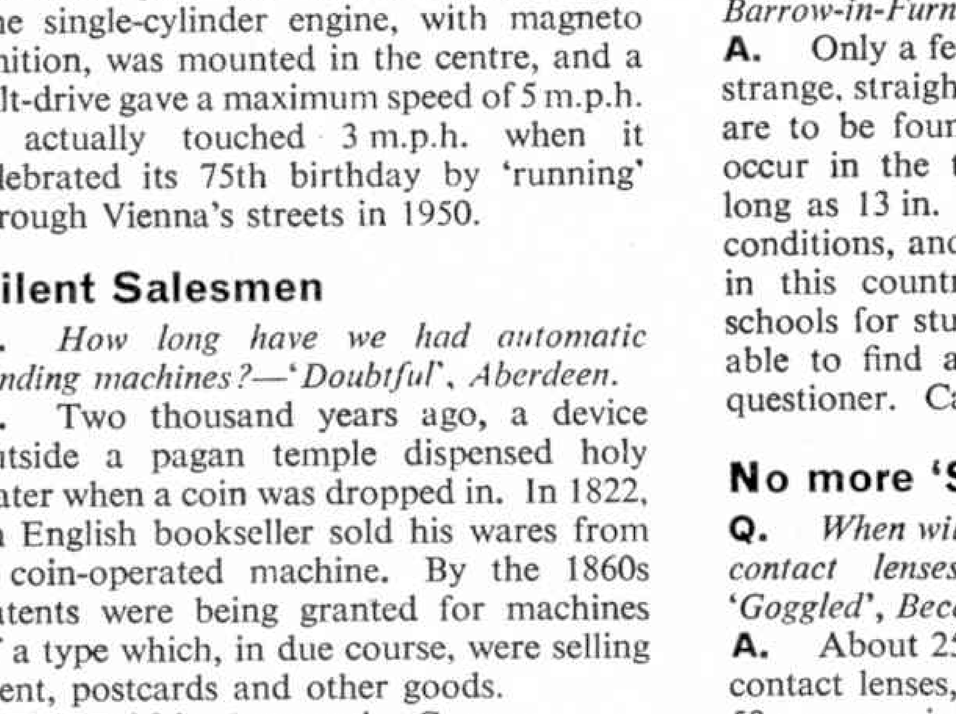
A. The first road carriage to be driven by some kind of spirit vapour was built by J. J. E. Lenoir in Paris in 1862. It actually had electric ignition, and was granted a patent in 1851. But the credit for producing the first petrol-driven car is usually given to the Austrian, Siegfried Markus. His four-wheeled, two-seater vehicle made its bow in Vienna in 1875, and is still preserved in working condition. The single-cylinder engine, with magneto ignition, was mounted in the centre, and a belt-drive gave a maximum speed of 5 m.p.h. It actually touched 3 m.p.h. when it celebrated its 75th birthday by 'running' through Vienna's streets in 1950.

Silent Salesmen

Q. *How long have we had automatic vending machines?—'Doubtful', Aberdeen.*

A. Two thousand years ago, a device outside a pagan temple dispensed holy water when a coin was dropped in. In 1822, an English bookseller sold his wares from a coin-operated machine. By the 1860s patents were being granted for machines of a type which, in due course, were selling scent, postcards and other goods.

The British Automatic Company was formed in 1890. Soon afterwards, London had a machine which sold hot water at a penny a gallon, and others which dispensed packets of tea, cocoa and condensed milk. By the early 1900s, more than 3,000 machines at railway stations were selling over 16 million packets of sweets and chocolate every year. Since the last war, the number of machines has increased with their versatility—and it is claimed that they take only one 'dud' coin for every 800,000 sales.



Whether you want sweets, milk, a pair of nylons, a packet of cigarettes or even a pork pie, you can get them from a vending machine! How long ago were these self-service machines invented? See the surprising answer above.

Sticky Problem

Q. *Where can I buy stick insects for breeding? None of the pet shops near my home have heard of them.—K. Ralph, Barrow-in-Furness, Lancs.*

A. Only a few of the 600 species of these strange, straight-winged insects (*Phasmidae*) are to be found in Europe. They mostly occur in the tropics, where some are as long as 13 in. They can be bred in warm conditions, and there are sources of supply in this country which provide them to schools for study; but I have not yet been able to find anyone who can oblige our questioner. Can any reader help?

No more 'Specs'?

Q. *When will more people be able to wear contact lenses instead of spectacles?—'Goggled', Beccles, Suffolk.*

A. About 250,000 people in Britain have contact lenses, which cost between 35 and 50 gns. a pair. This is due to the expense of grinding and fitting the lenses to suit each individual eye. But the prospect of a much cheaper lens made of very soft plastic is offered by experiments taking place in Prague. The lenses are so porous that tears can pass through them to provide the cornea with oxygen, and patients have worn them for a whole week without discomfort.

Perennial 'Prisoner'

Q. *You said 'The Prisoner of Zenda' had been filmed four times. But I seem to remember a version round about* 1918, *with Henry Ainley in the title-role.—H. O. Burnell, Newport Pagnell, Bucks.*

A. Your memory doesn't deceive you! Though my records were confined to Hollywood adaptations, I find that a film version of the stage play by Edward Rose was made by the London Film Company at Twickenham in 1915, and that Henry Ainley was the star. He also starred in a film of the sequel to Hope's novel, *Rupert of Hentzau*, produced by the same company later that year.

Suicidal Rodent

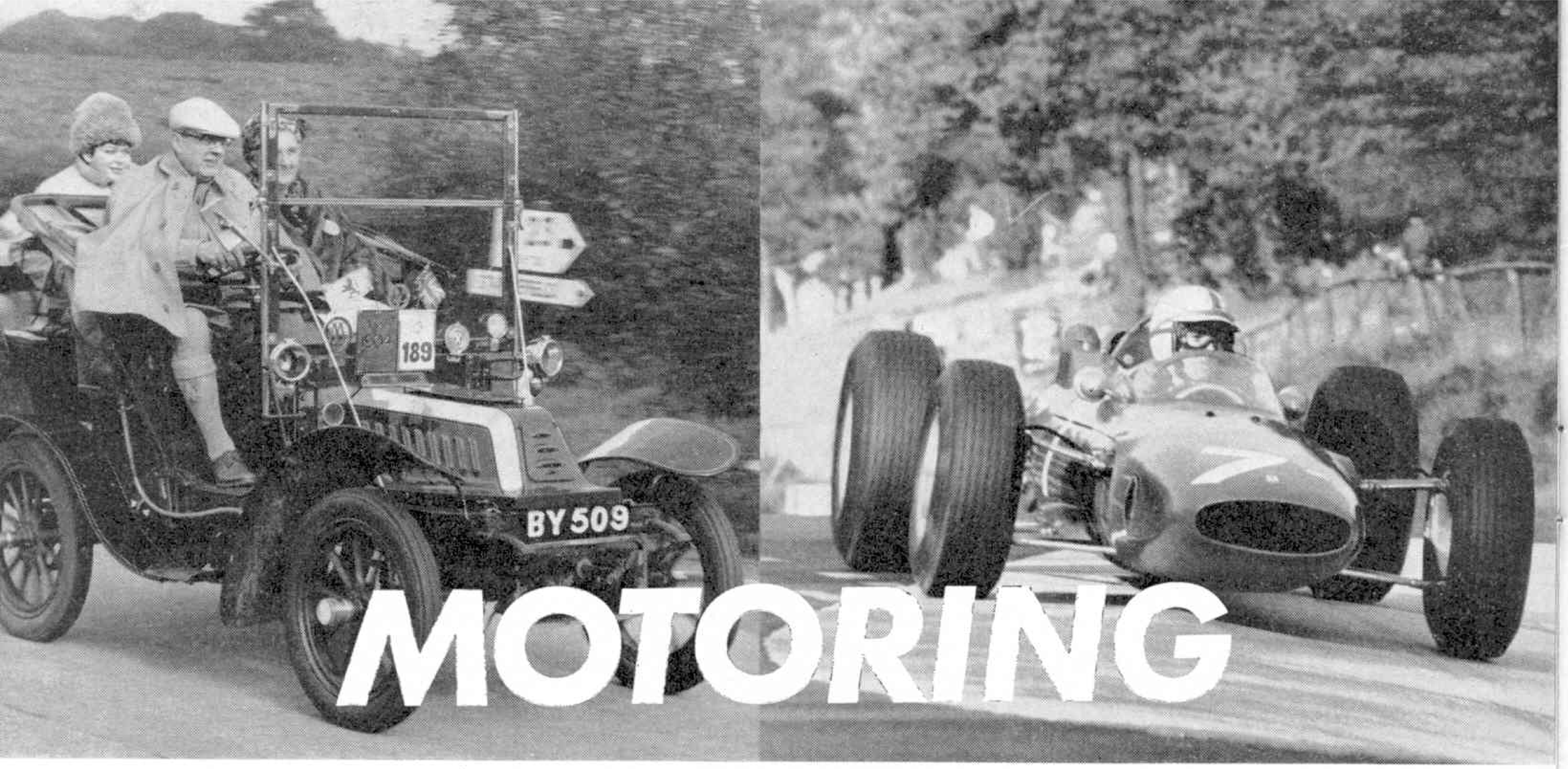
Q. *Is it true that lemmings commit mass suicide to keep down their numbers?—'Animal Lover', Stowmarket, Suffolk.*

A. Naturalists do not have enough evidence to say positively if this legend has a factual basis. All we know is that every few years the numbers of this little Scandinavian rodent (which is also found in America and Alaska) increase to such proportions that starvation threatens. So they migrate from their normal mountain habitat to the fertile valleys, spreading out as they multiply. On reaching water, they try to cross it, and can usually swim rivers and lakes. But hundreds of thousands drown in the sea and are washed up in the fiords, perpetuating the myth of their 'suicide'.

Star House

Q. *I am told that London is to have another planetarium. Can you say where it will be?—'Star Eyes', Wimbledon.*

A. Work is proceeding now on a planetarium sited in the Royal Park at Greenwich. It will be connected with the National Maritime Museum, and be more concerned with the stars as aids to navigation than as a spectacle. Seating 50 people, it should be ready fairly soon.



MOTORING

A 1904 De Dion Bouton passing through the countryside on its way to Brighton during the London to Brighton veteran car run

past and future

World Champion driver, John Surtees, at the wheel of the Ferrari on his way to winning the 1964 German Grand Prix

ALTHOUGH Britain lagged far behind other countries in the development of the automobile, one of the world's first international motor shows was staged in 1889, near London, in Richmond's Old Deer Park. The show ran for a week and gave many people their first glimpse of horseless carriages. Later, shows were staged at the Agricultural Hall, Islington, which, after the Society of Motor Manufacturers and Traders was formed in 1902, became the official Motor Show.

As Britain's motor industry expanded, bigger halls were needed and the Motor Show moved first to London's Olympia and, shortly before the last war, to a vast new hall at Earls Court. Here today, it is regarded as one of the major shows in the world, attracting more than half a million visitors each year.

Stumbling blocks to the development of the first motor cars in Britain were our antiquated laws which, until the Locomotives on Highways Act of 1896, required a man to walk in front of a motor car each time it moved under its own power on public roads.

It took a good deal of hard battling to get this Bill through the Commons, for it daringly allowed cars a maximum speed of 14 m.p.h. on public highways, although local authorities were empowered to reduce this to 12 m.p.h. and this most of them did. However, our legislators considered this an enormous concession to what they termed 'foul abominations that polluted the highways,' in a land sacred to the horse.

Fourteen m.p.h. wasn't much of an improvement, but it provided a jolly good excuse for a celebration and the leaders of this new motoring brigade decided it should take the form of a run from London's Metropole Hotel in Northumberland Avenue, near Charing Cross, to the Hotel Metropole at Brighton.

In later years, the run was revived by a daily newspaper as a publicity stunt. This led to the formation of the Veteran Car Club, which today is the acknowledged world authority on veteran cars. Soon after the 1927 stunt, a regular run from London to Brighton for machines built before 1904 was instigated and held under Britain's senior motor club, the R.A.C.

The London to Brighton run is acknowledged to be the most popular event of the year, attracting entries from as far afield as America, whilst more than a million spectators line the route each year to cheer the old cars and their drivers.

That very first Emancipation Day Run took place on 14th November 1896. It attracted more than 30 entrants from Britain and overseas, including many famous European motorists. But not all were serious competitors, for five electric vehicles, including a bathchair, turned up at the start. Naturally, their batteries soon gave out and they finished the journey by train. One competitor, E. J. Pennington, missed the 10 o'clock start simply because he was so busy demonstrating his Pennington tricycle to admiring crowds that he was hemmed in on all sides. He had to join the procession later.

Racing Veterans

The first car to move off was a famous racing, two-cylinder Panhard Levassor, driven by Otto Mayer, a friend of Benz and Daimler. This car, owned by H. J. Lawson, the financier and part organiser of the run, had achieved fame in the Paris-Bordeaux-Paris race a few months earlier. The third machine, a Canstatt-Daimler, included among its passengers the famous engineer, Gottlieb Daimler and F. R. Simms, who shortly afterwards helped to found the R.A.C. Two very interesting vehicles from France were the racing Bolleé three-wheelers, driven by the brothers Leon and Camille Bolleé.

The event was not supposed to be a race, a point which

some Continental competitors refused to understand; for up to Reigate, where a voluntary lunch stop was scheduled, a battle was going on between the Panhard, Bolleé and the American Duryea. The first two Brighton finishers were the Bolleé brothers. Leon was first home, covering the 56 miles in 3 hours, 44 min. 35 sec., averaging 14·9 m.p.h. A fantastic performance for 1896, in cars with sensitive steering and virtually no brakes by modern standards. His brother, Camille, who finished second, took 4 hours and 20 sec. A Duryea is said to have finished third.

Although the very first practical motor cars were built in Germany by Carl Benz and Gottlieb Daimler, it was French engineers and drivers who did much to develop the early cars through racing, with speed contests that were forbidden on British roads. Thus, our motor industry didn't really come into the picture until very late in the day.

Curiously enough, in modern times, the roles are reversed. Britain has been dominating Grand Prix racing for several years now, whilst France is considered a back number.

A new World Champion

While on the subject of racing, the last Formula One championship race for the 1964 season took place in Mexico City, but the name of the new World Champion Driver, John Surtees, was in doubt right to the final lap.

The Mexican Grand Prix, over a tight 3·2 miles circuit, 1½ miles above sea level, was full of drama and it provided a thrilling climax for the fiercely fought 1964 World Championship between Graham Hill, John Surtees and Jim Clark. On paper their chances seemed to be in that order but, as always, motor racing is full of surprises and it was Surtees who walked off with the sport's most coveted honour.

Thus, John Surtees, O.B.E., married and living at Limpsfield in Surrey, becomes the first man to gain the World Championship both on motor cycles and cars. He began his motor cycling at the tender age of 11 on a machine he bought for twelve pounds and, as soon as he was old enough, started racing. Surtees first tried his hand with racing cars in 1960, and was good enough to finish second in a Cooper in the British Grand Prix of that year.

The following season, he began motor racing in earnest and has never stopped trying. That great sportsman, Enzo Ferrari, a very good judge of drivers, quickly snapped him up for the 1962 season and has given him full backing ever since. He, too, now reaps the rewards for his judgment by winning the Manufacturers' World Championship for 1964.



John Surtees signs an autograph for a motor racing enthusiast. (All photographs reproduced by permission of 'Autocar')

Big time Formula One racing usually ends in December and begins again with the Monaco Grand Prix in May, but the final year of the 1½ litre Formula, begins with the South African Grand Prix early in January 1965. Enzo Ferrari has entered a car for John Surtees to defend his world title but, instead of the V-8 he used in Mexico, I expect to see him behind the wheel of the faster, more powerful, flat-12-cylinder model, now adding reliability to its other desirable qualities.

With some exciting new cars on the horizon for next season, Surtees forecasts a pretty hectic battle for the 1965 Formula One World Championships. In South Africa, Cooper will appear with a new, lighter model and it should have the new flat-16 Coventry Climax engine. Coventry-Climax say only three of these new engines will be built, one each for Lotus, Brabham and Cooper. Power produced is something like 215 b.h.p., which is rather more than the 12-cylinder Ferrari and Honda. Unfortunately, it appears that servicing arrangements may only permit them to enter selected races.

This accounts for Jack Brabham's decision to drive less in Formula One races next year, but spend more time supervising the preparation of his cars. Keep an eye on the Brabhams for 1965, they should be faster than most and if Jack can achieve the desired reliability, I would tip his cars to achieve World Championship status. I think and hope he will retain Dan Gurney, whom I have long rated as one of the best drivers in the world.

The Japanese Honda team would like to employ Dan Gurney, but I don't think that he will move. Honda are building brand new cars for next season, drivers will be Ronnie Bucknum and their motor cycle champion, Jim Redman, Richie Ginther, who was in the running to join them from B.R.M. is now not so certain; it would never surprise me if he joined the Italian A.T.S. team, which has great plans for next season, or he might be seen at the wheel of a Brabham.

Expect Jim Clark to stay with Lotus and Graham Hill with B.R.M., where he will be joined by Jackie Stewart. Bruce McLaren will lead the Cooper team, possibly aided by Chris Amon. With all these changes and new cars coming along Formula One racing during next season should be every bit as exciting as the season that has just ended. **— Jerry Ames.**

Crowds gather in Hyde Park to watch the early morning start of the Veteran Car Run to Brighton





by **John W. R. Taylor**

Skymasters in formation. These small Cessna aircraft can fly on one or both of their twin engines, with a maximum speed of 183 m.p.h. and an optimum range of 1,315 miles

FLYING SANDWICHES

THE picture opposite looks a little frightening at first glance. The engine of the aeroplane has clearly stopped and everyone knows that satellites are the only heavier-than-air objects that will stay up without a power plant of some kind to keep them there.

Yet, if you look closely at the original photograph, you can see the pilot smiling cheerfully through a side window. He can afford to do so, as this aircraft, the French-built Matra-Moynet 360 Jupiter, has a second engine and propeller at the back and he is simply demonstrating its ability to fly on one engine.

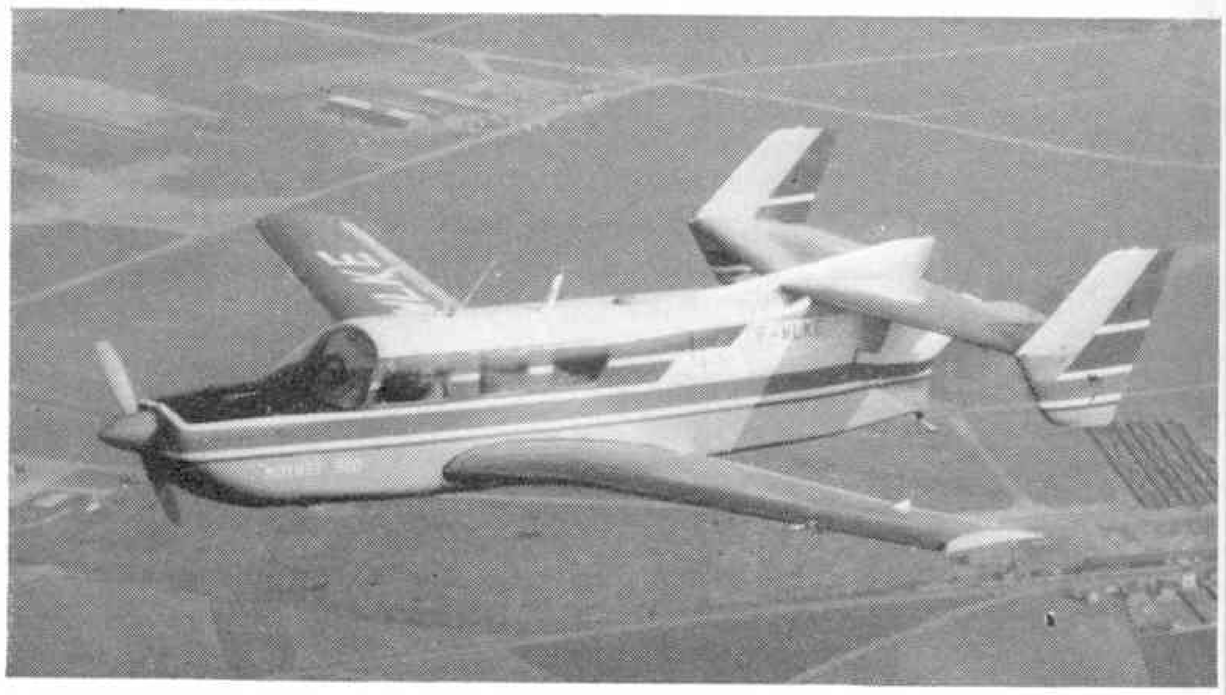
The Jupiter's push-and-pull layout is the latest idea in the design of business and private aircraft. Many people who pilot this class of 'plane would like to take advantage of the extra power and safety offered by two engines but find the average light twin rather a handful by comparison with the single-engined types on which they learned to fly. This is particularly true if an engine stops in flight. The remaining engine, being normally out on the wing, tends to try and make the aircraft fly in a circle, or tip up on one wingtip. The pilot has to know how to operate the controls to keep straight and level and it is not easy.

Most of the troubles vanish when the engines are moved from the wings to the nose and tail, as in the Jupiter. Being on the aircraft's centre-line, they do not try to make the aircraft circle if one engine stops. In fact, the pilot who wants economy rather than speed can stop either engine in flight and cruise perfectly safely on the power of the remaining one.

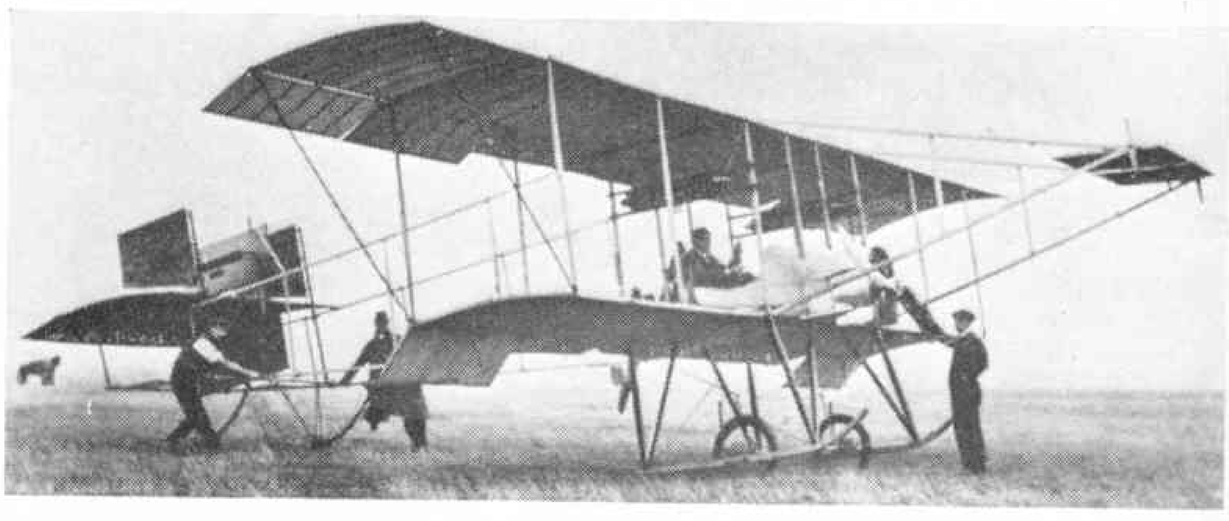
If this is such a good idea, why hasn't it been done before? The answer is that is has—as long ago as 1911 and in this country.

The engines of those days were not very powerful. The best in the world was probably the French Gnome rotary, which gave about 50 h.p. The engine of the average modern family car develops more power than this, so it is hardly surprising that the aeroplanes of 1911 had a top speed of around 50 m.p.h. and carried only small loads.

Horace Short, one of the famous Short brothers, who laid the foundations of the British aircraft industry in 1909, was not satisfied with this. Looking far beyond the frail and slow stick-and-string box-kites of the time, he told friends that there was no limit to what aeroplanes could do if they were given sufficient power. To prove his point,

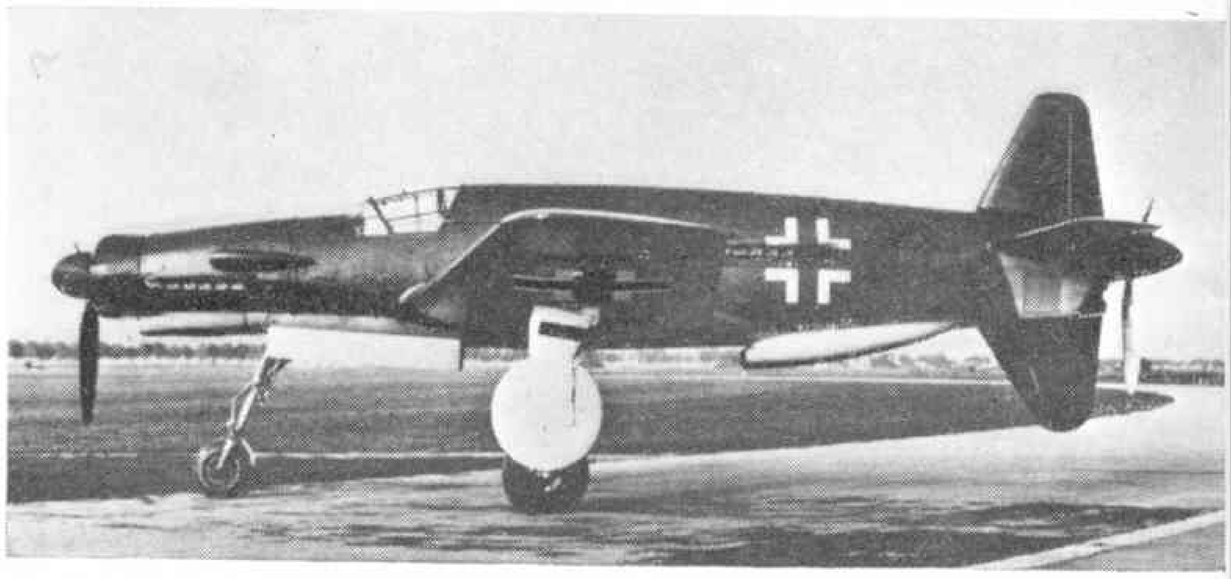


A competitor for the Skymaster, the French Matra-Moynet Jupiter



Above: The original 'flying sandwich', the Short Tandem Twin

Below: The unusual Dornier DO335 'push and pull' fighter of 1943



he built the first aeroplanes in the world with more than one engine.

The first of these was the push-and-pull Tandem Twin, in which the pilot and passenger sat in a short cockpit nacelle between a pair of 50 h.p. Gnomes. Most aircraft of the time were given nicknames and this one became, inevitably, the 'Gnome Sandwich'. Its pilots, exposed to the double draught from engines a few feet in front and behind them, named it the 'Vacuum Cleaner'. If this seems a little unkind, it may be as well to note that other early Short products were known as the 'Field Kitchen', because the two engines in front made it so hot, and the 'Double Dirty', because its engines had a habit of spraying the pilot with oil.

During the 20 or 30 years that followed, several designers built push-and-pull aeroplanes, without great success, unless we count large machines like the Short Singapore and Dornier Wal flying-boats, in which the engines were mounted in tandem pairs above or between the wings. Such an arrangement often brought problems, as the rear propeller was less efficient through working in the slip-stream from the front one, and it was often difficult to provide sufficient cooling air to prevent the rear engine from overheating.

Horace Short mounted the two engines of the 'Gnome Sandwich' in tandem because it seemed the obvious place to put them. Most subsequent twin-engined aircraft have carried their engines on the wings, where they work most efficiently. The main drawback with this arrangement is that it adds to the aircraft's drag. So, when the Dornier company began work on a powerful new fighter for the German *Luftwaffe* early in World War II, they decided to see if they could reduce drag, and so achieve higher speeds, by turning to the tandem-engine layout that had worked so well on their old Wal flying-boat. The result was the Do 335 Pfiel (Arrow), one of the most unorthodox aircraft produced during the war.

Farnborough Showpiece

The R.A.F. brought one back from Germany in 1945 and, with its propellers at nose and tail, stalky under-carriage and massive size, it was one of the sensations of the display of captured enemy equipment staged at the Royal Aircraft Establishment, Farnborough. This particular example was a two-seater, but the basic Do 335A-1 was a single-seater fighter-bomber, powered by two 1,900 h.p. Daimler-Benz DB 603G engines mounted fore and aft of the cockpit. It was armed with one 30-mm. and two 15-mm. cannon and 1,100 lb. of bombs and weighed nearly 12 tons, which was a lot for a fighter in those days. It was also fast, with a top speed of 413 m.p.h.

Dornier's Arrow was too late to see action in the war. In any case, it did not live up to its name, for *Luftwaffe* pilots found that it did not fly straight and true but had a tendency to "snake" and "porpoise" at high speed.

So, once again, the tandem-engined layout almost faded from the scene, except for a number of military prototypes, some with a turboprop in front and jet in the tail. Then, in 1961, came the surprising news that the American Cessna Company had decided to put into production a new four-to-six-seat business-plane named the Skymaster, with push-and-pull engines.

It was nothing new for Cessna to set the pace in this class of aircraft. Three years earlier they had put into production the first specially-designed businessman's helicopter, as they felt the time was right to offer all the advantages of vertical take-off and landing in this huge market. It proved an expensive failure, as U.S. companies did not consider the extra cost of the helicopter worthwhile.

Plenty of people forecast an equal lack of success for the unorthodox Skymaster, feeling that businessmen would prefer to stick to the sort of aircraft they were used to flying. Cessna staked a fortune on the belief that pilots accustomed to flying single-engined types would find the Skymaster easier to handle than a conventional twin, especially on one engine. Performance was quite good, with a cruising speed of up to 173 m.p.h. on the power of two 210 h.p. Continental IO-360 engines, and its price (about £17,500 in Britain) made it one of the least expensive light twins on the market.

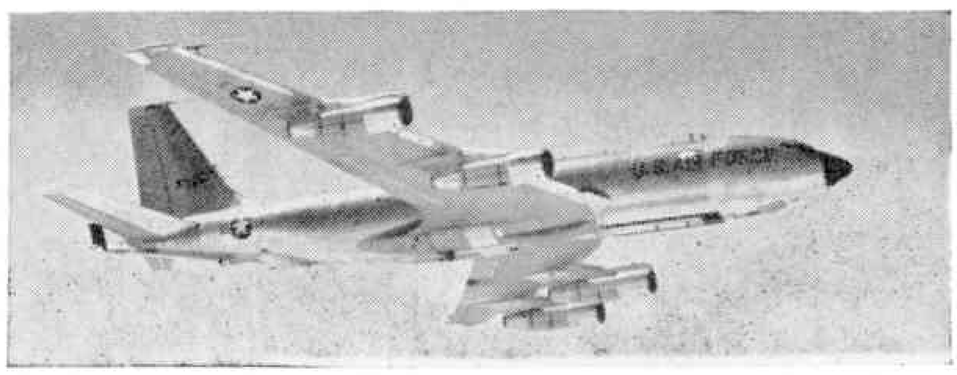
It is too early to decide whether or not the Skymaster will set a fashion for future business aircraft; but 176 were sold in the first ten months after it began leaving the assembly line. It has been a familiar sight to young spotters in this country since the Autumn of 1963, when G-ASKS and G-ASLL gave us our first glimpse of this unique design.



Historic Bunkhouse

Boy Scouts who attend courses at the Scout Association's new Air Training Centre at Lasham Airfield, Hants., will spend their nights in historic surroundings. On October 24th, Dan-Air Services Ltd., the British independent airline, presented to the Scouts the Avro York G.ANTK, and it is being converted into a bunkhouse at Lasham.

G-ANTK belonged originally to the R.A.F. and took part in the Berlin Air Lift. Later, it was used to fly equipment to the Woomera Rocket Range before being demobbed and joining Dan-Air. Its civilian jobs included carrying famous racing cars to the Continent, Hungarian refugees from Vienna to London following the 1956 uprising and Emperor Haile Selassie's silver throne to Ethiopia. Although grounded now, it will continue to play its part in building up air-mindedness in boys who seek adventure through Scouting.

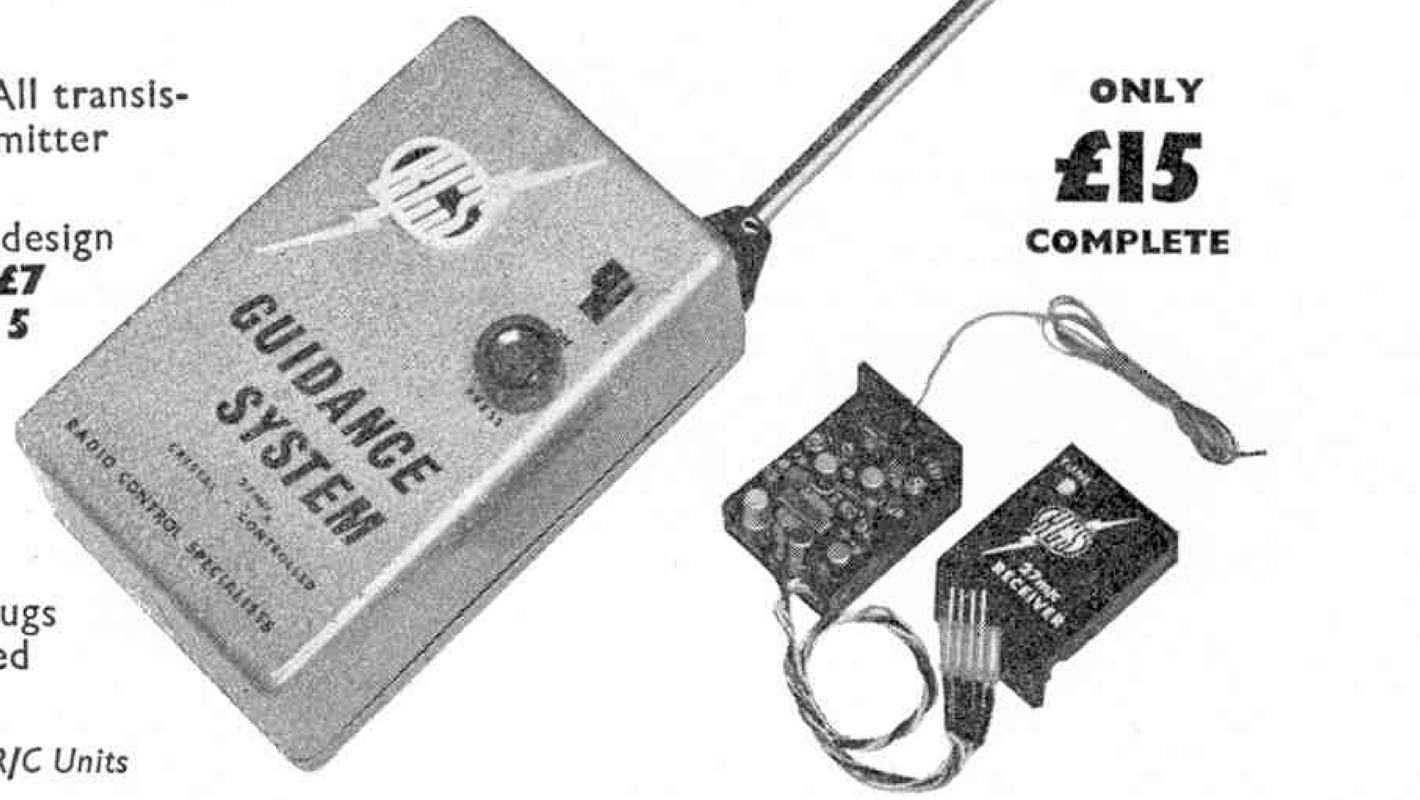


Flying "Hot Line"

The aircraft shown in the illustration above does not look very different from the 700 other Boeing C-135s that have been built in recent years, but the vast array of aerials and radomes sprouting from its fuselage, wingtips and fin identifies it as one of seventeen special KC-135Bs now being produced for the U.S.A.F. Strategic Air Command. Powered by four 18,000 lb. thrust Pratt & Whitney TF-33 turbofan engines, each of these aircraft is equipped as a miniaturised version of the SAC control centre at Offutt Air Force Base and could order the entire U.S. bomber force into action if the ground centre were destroyed at the start of a war. At least one KC-135B will be airborne at all times, manned by a flight crew of five, one general and a staff of ten. To enable it to remain in the air for long periods, it is equipped to refuel in flight from other KC-135Bs, from ordinary KC-135A tanker-planes or, in an emergency, from bomber aircraft.

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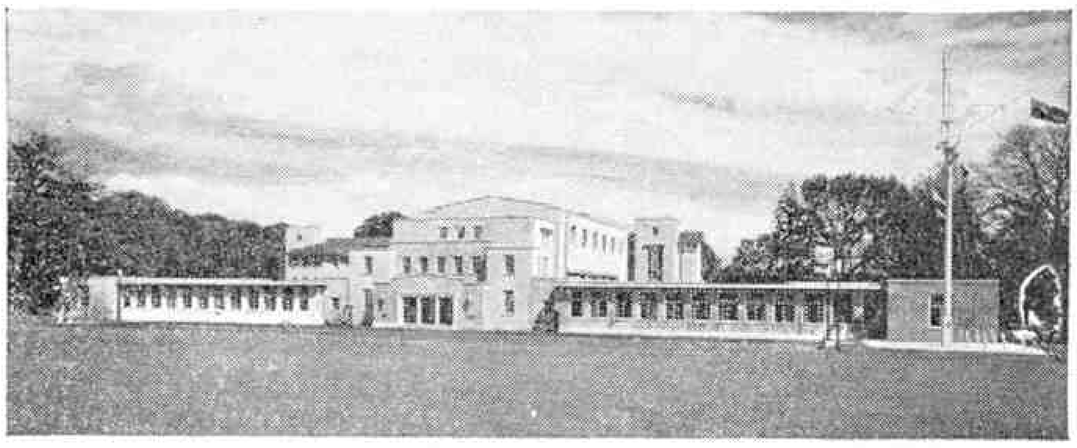
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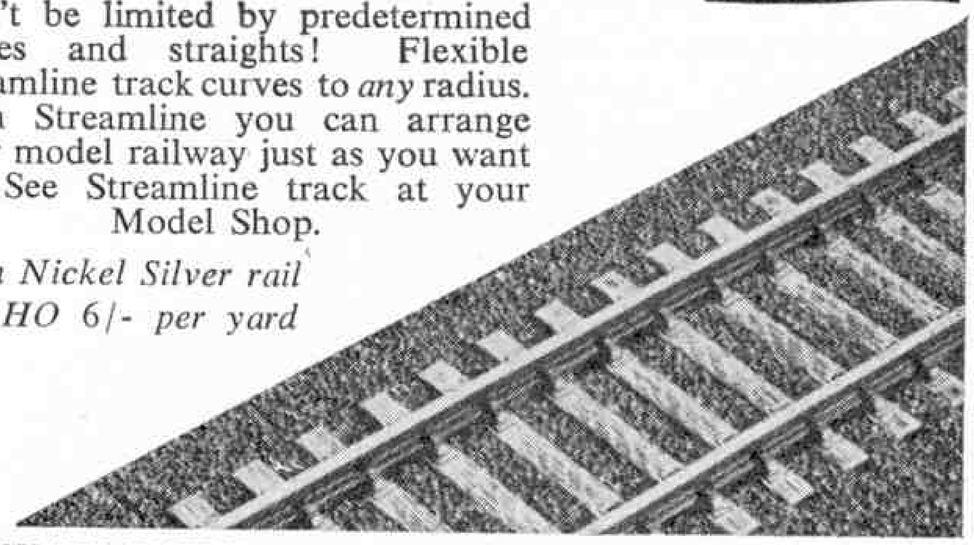
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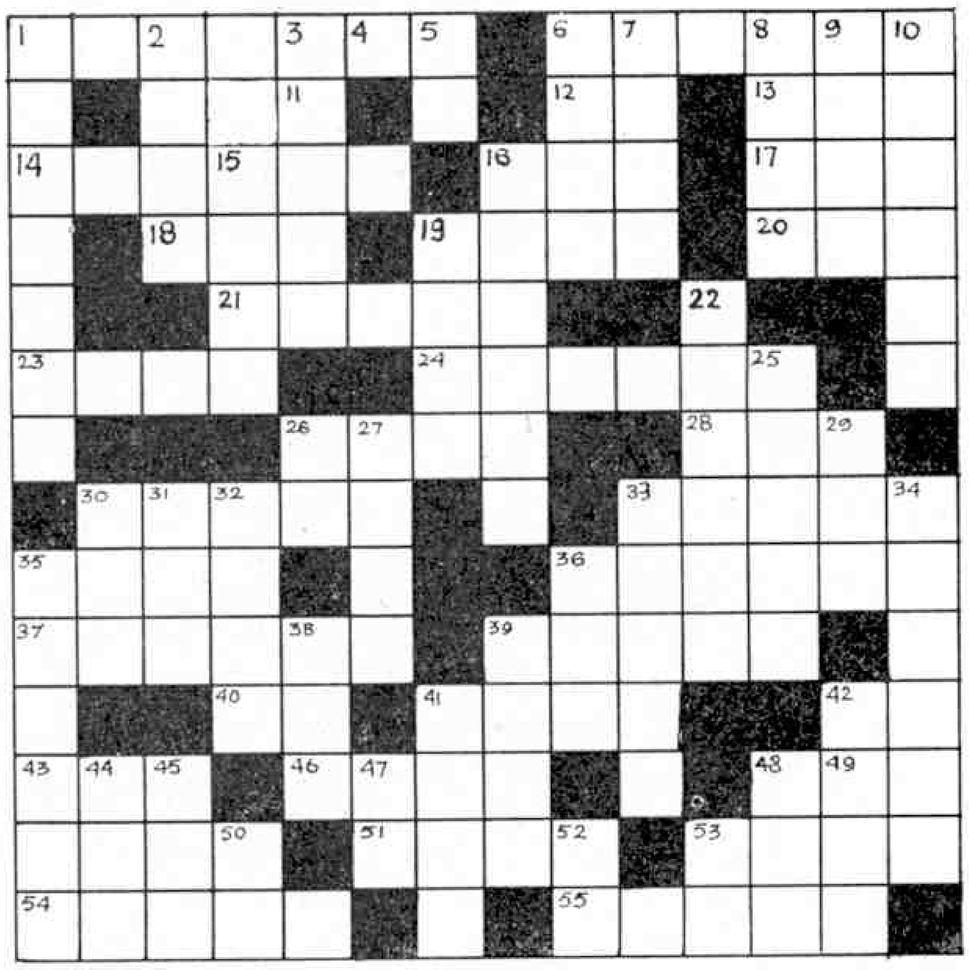


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Puzzle Page

Turn to page 39 for answers to the puzzles on this page

Crossword Puzzle No. 2



ACROSS

1. Solar scorch (7).
6. Help (6).
11. Also (3).
12. Noted artists usually end up with this! (2).
13. Hilltop in Devon (3).
14. Open your eyes! (6).
16. Writer's tool (3).
17. Large bird (3).
18. The first lady (3).
19. Bookworms do it (4).
20. Arabian Airline (3).
21. Satellites do it (5).
23. To work for (4).
24. Fencing piece (6).
26. Nice when candied (4).
28. Curve (3)
30. For sitting (5).
33. Ghosts do it (5).
35. Prank (4).
36. Ethereal (6).
37. Goes in (6).
39. Shoreline (5).
40. Another negative (2)
41. File (4).
42. Go there (2)
43. Container (3)
46. Army in Germany *abbr.* (4).
48. Masculine (3)
49. God of Love (4).
51. Bad for clothes (4)
53. Planet (4).
54. Place for food (5).
55. Build (5).

DOWN

1. Used on horses (7).
2. Flows through deserts (4).
3. Speak (5).
4. Found in fish (3).
5. Negative (2).
6. Tract (4).
7. Often goes with cement (4).
8. A detail (4).
9. Any quantity (4).
10. Played by some boys (6).
15. Shakespeare sat by it (4).
16. Seen on flowers (6).
19. The fruit's for picking (4).
22. Traps for game (6).
25. An olden coin (5).
26. River in Poland (2)
27. Trees (4).
29. Engine part (3).
30. Mother's joy' (3).
31. Tit for —— (3).
32. Good for drawing! (4).
33. Found on a vine (5).
34. Ladders are seen here! (6).
35. Tugs (6).
36. Spanish two (3).
38. Steal (3).
39. In trouble if you're in it (4).
41. Flowers thrive on it (4).
42. Nice with jam in it (4).
44. Painter's cult (3).
45. Also (3).
48. For rain (3).
50. Southern Railway (2).
52. Third man (2).
53. Not you (2).

Three men had been dining in a restaurant and the waiter wrote out the bill which totalled 30 shillings. They handed over the money, but when the waiter took it to the cash-desk, the cashier discovered that a mistake had been made. The bill should only have come to 25 shillings, so she handed back to the waiter 5 shillings to give to the customers.

The waiter, being a little on the dim side, couldn't divide 5 shillings by three—so he gave each man a shilling and put the other 2 shillings in his pocket. Therefore, it will be seen that each man, having paid 10 shillings in the first place and now having a shilling returned, had actually paid 9 shillings for his meal. Now, here's the peculiar part—three at 9 shillings equals 27 shillings. The waiter kept 2 shillings—which brings the total up to 29 shillings. Where has the other shilling gone? (See answer on page 39.)

● ● ● ● ●

Which four letters will, in various arrangements, supply all the missing words in this paragraph:

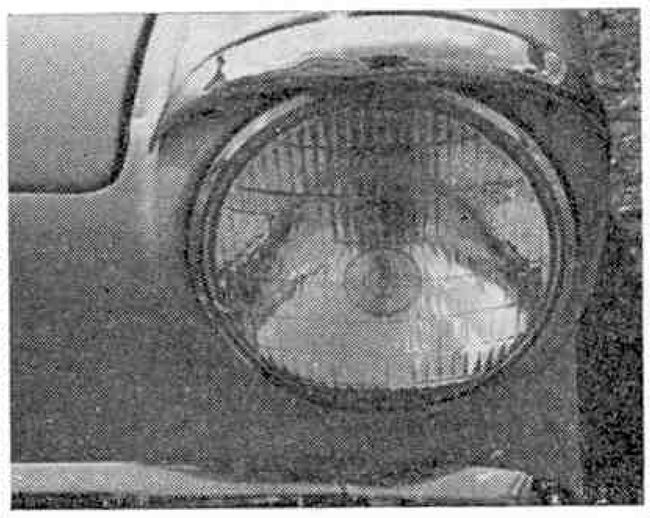
'A —— of laughter greeted Michael's —— to them not to risk the climb; it was a —— in the dark and he turned —— at the thought of it.'

● ● ● ● ●

Say to a friend: 'What was the name of the Prime Minister in the last war?' He will no doubt reply: 'Winston Churchill.' You then tell him he's wrong. The answer is HAROLD WILSON. Why?

● ● ● ● ●

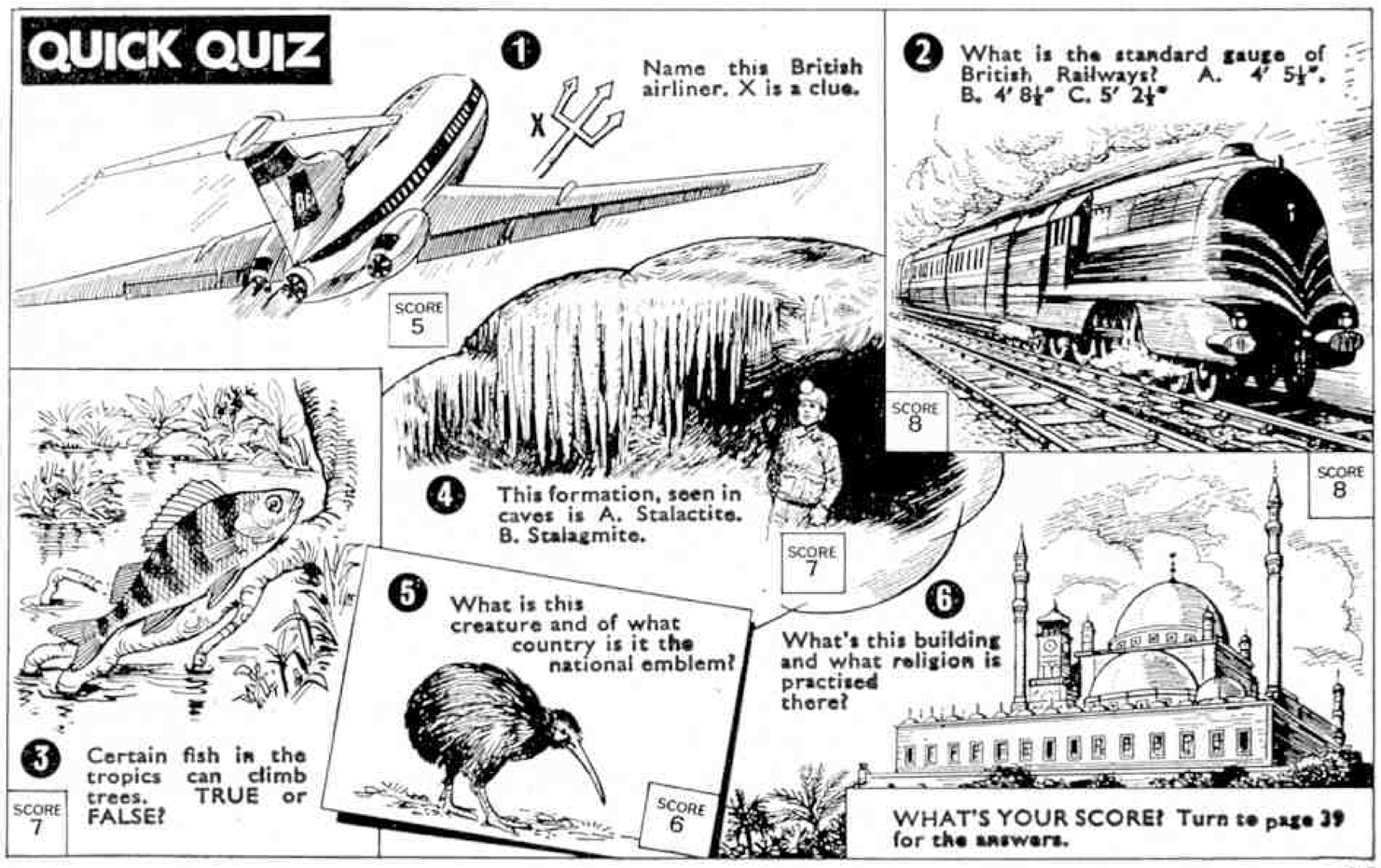
How good are you at arithmetic? If eight eights are sixty-four, how can you make eight eights equal one thousand? It's not impossible as you can see by looking at the solution on page 39.

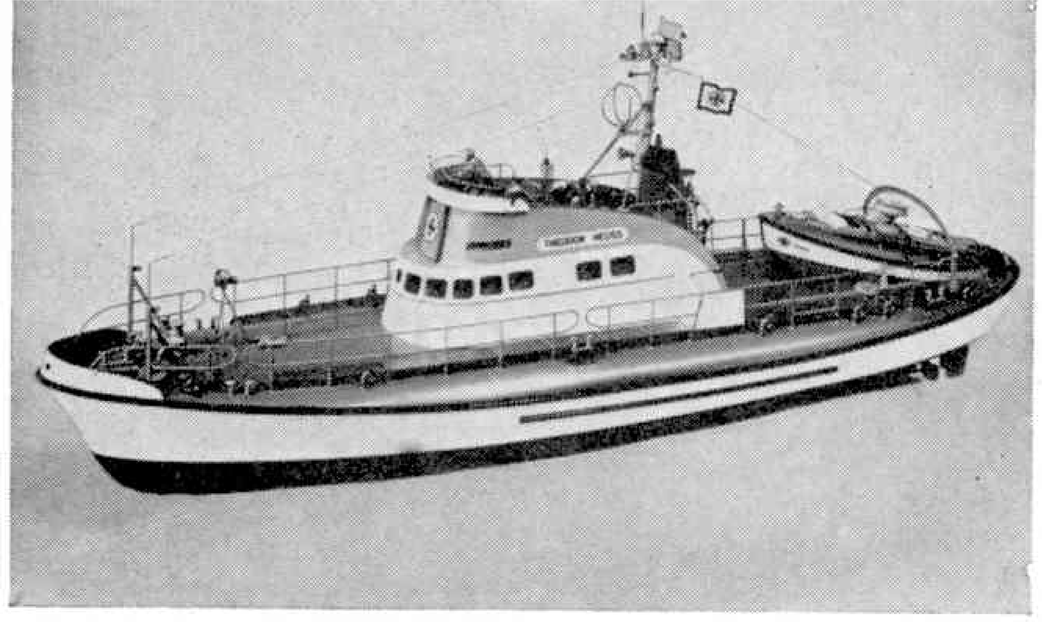


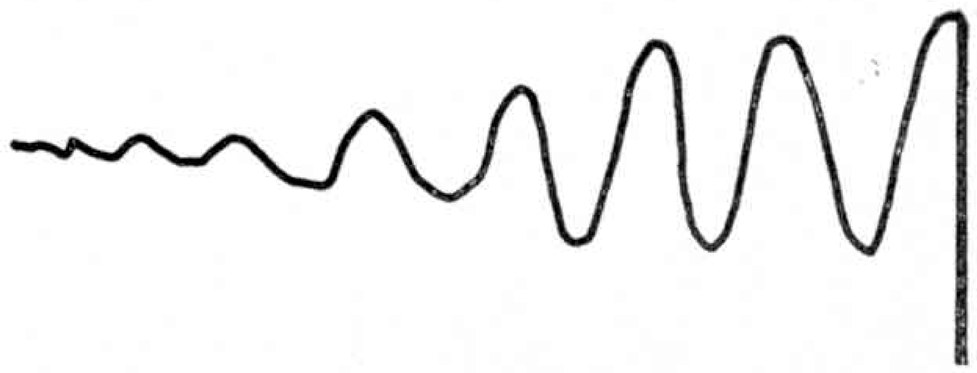
Car Quiz No. 4

One of the most popular small, British family saloons. The parent company originated in America. (Answer on page 39)

QUICK QUIZ







RADIO

by **F. C. Judd A.Inst.E.**

BUILDING models of aircraft, ships and motor cars is in itself a fascinating hobby and a well-made but otherwise stationary model can give much satisfaction to the maker. But how much more satisfying it is to make the model come to life, to almost place yourself behind the wheel of that model launch, to steer it and to control its engine as it glides across the water. You can do this with radio control, which becomes the link between you and the model and the means of conveying your commands.

Radio control can be applied to any working model, be it a boat or an aircraft or a motor car or even a stationary model which has working parts. This introduction deals with the principles of radio control, but later I shall be dealing with the construction of a scale model motor launch and a complete radio control system to steer it and control the engine.

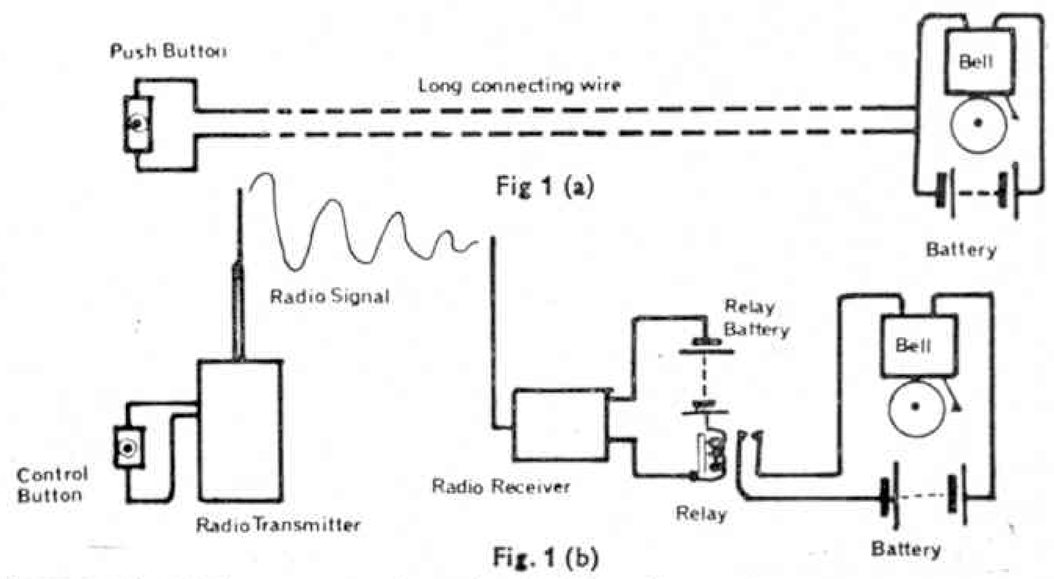
How Radio Control Works

Let's begin with a simple explanation of remote control by means of electric current. The electric door bell is an easy one to understand and when the button is pressed at the front door, the electric current travels down the wire and actuates (remember that word) the electromagnetic mechanism of the bell. This may require long wires between the push button and the bell, but supposing we wanted to actuate the bell at some distance *without* long connecting wires.

Take a look at Fig. 1 which shows in (a) an ordinary bell circuit. In (b) however, the wires have been replaced with a RADIO LINK and the bell, together with its battery, is quite independent. It could, therefore, be placed almost anywhere within radio range.

The electric bell could actually be carried about and be made to ring when required, but how does the RADIO LINK do this? We begin at the 'transmitter' which is normally switched OFF by interrupting the high tension supply. When the switch or control button is pressed the transmitter is ON and radio signals leave the aerial. When the button is released the transmitter is OFF and no signals leave the aerial. Here then is a simple means of conveying COMMAND SIGNALS to the radio receiver.

When a signal is received it must be further changed and amplified so as to finally provide a strong electric current; strong enough to operate a RELAY. A relay is really an electromagnetic switch and is the final link in the chain



A comparison between an ordinary door bell (top diagram) and a radio controlled bell (bottom). Basically, the difference between the two circuits is the radio transmitter and receiver, which replaces the wiring in the ordinary door bell

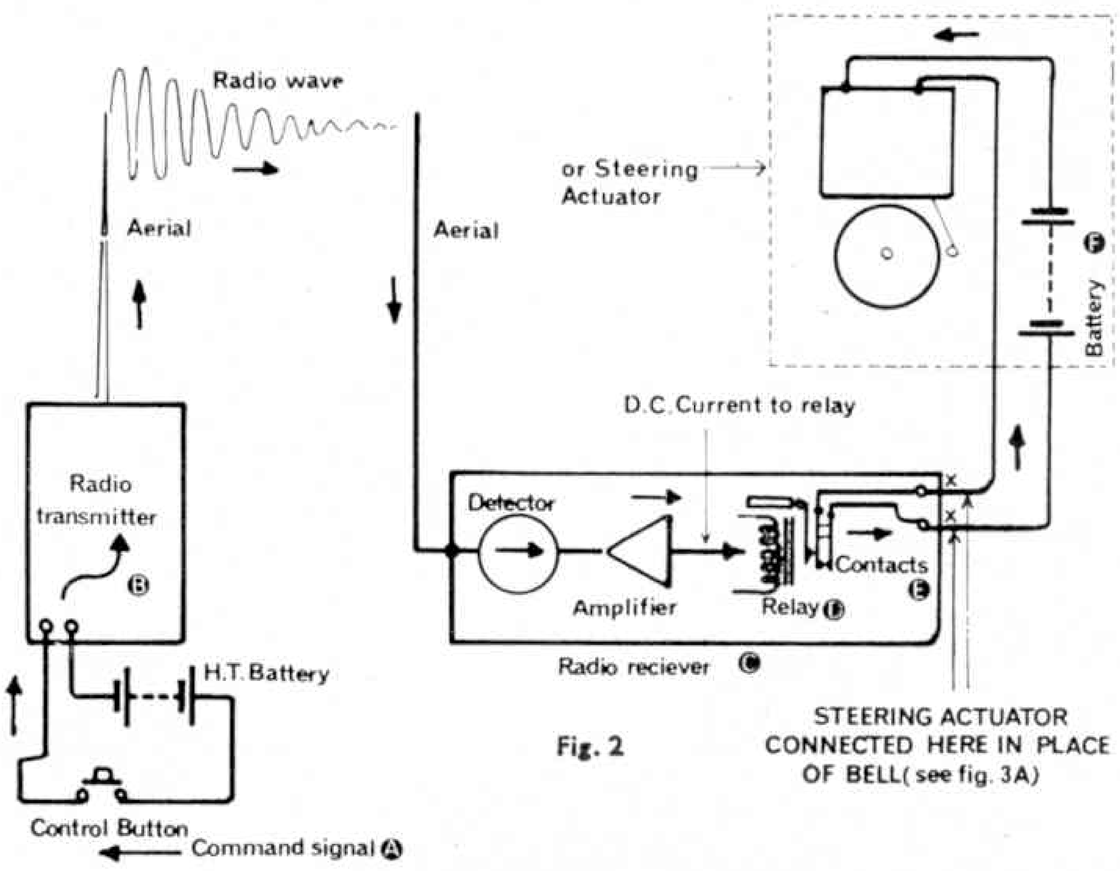
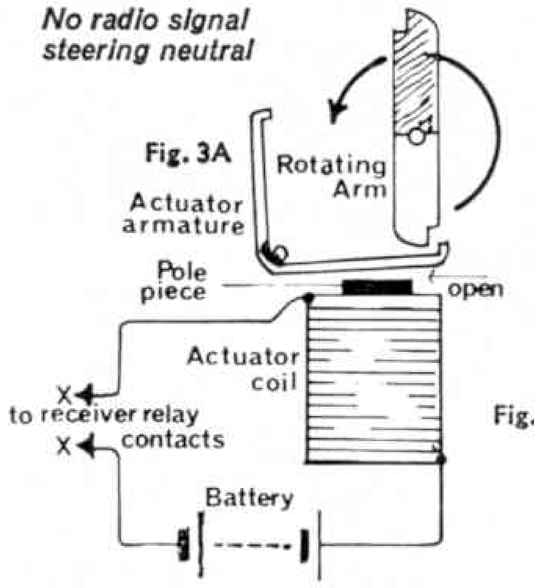


Fig. 2

The control signal path in a radio control system



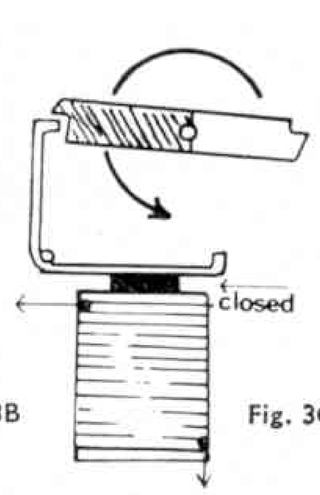


Fig. 3B

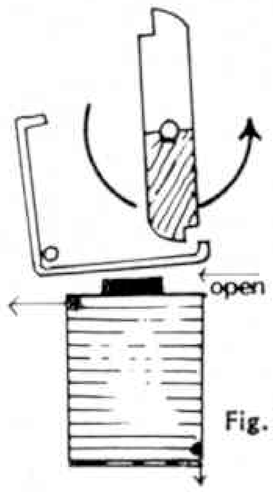


Fig. 3C

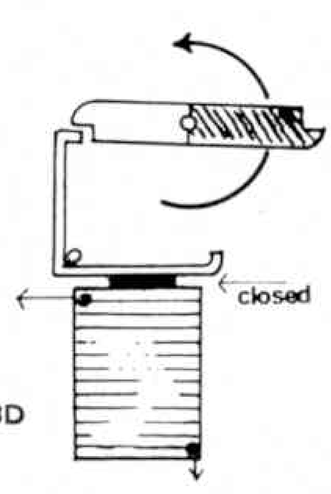
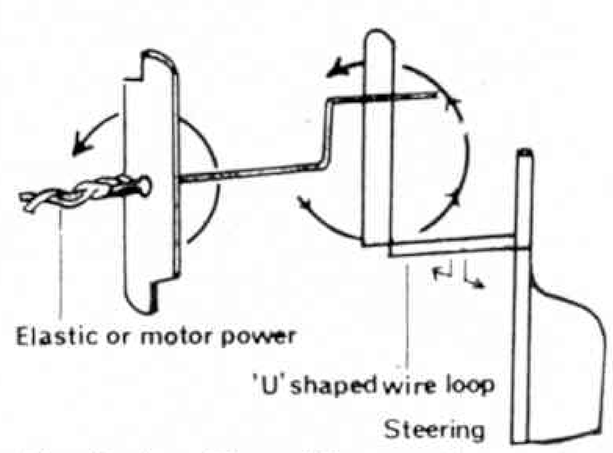


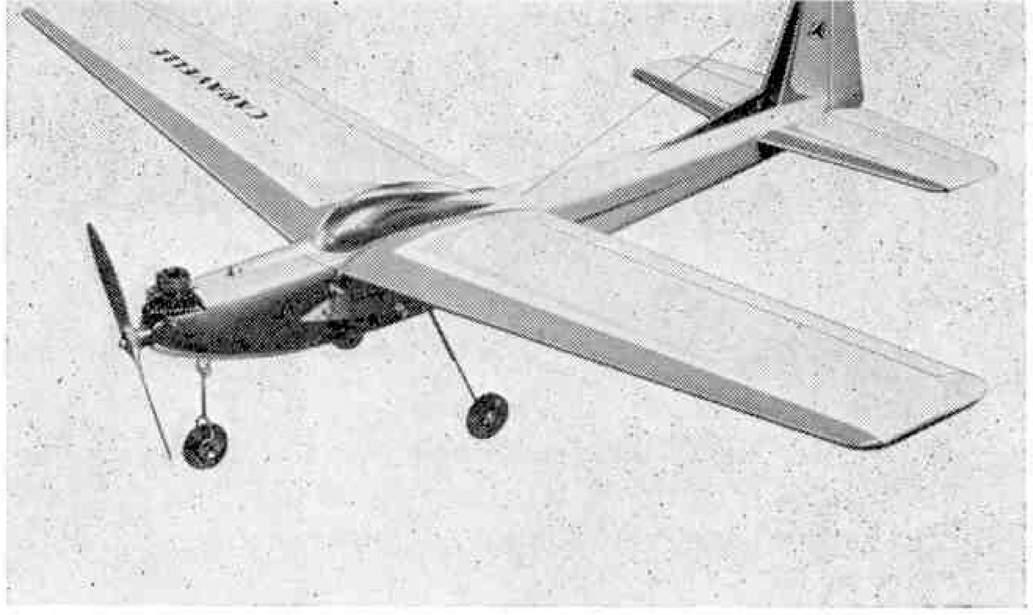
Fig. 3D

First radio signal steering left — *No radio signal steering neutral* — *Second radio signal steering right*

Simple rotating actuator to give sequential steering control



Note: The final position with no radio signal will be as first diagram, steering neutral. Above is shown the method by which the rudder is moved to the right or left by the motorised arm which is released by radio signals



CONTROL

of radio control. The contacts on the relay are used to switch the necessary current, to the electric bell in this case, which is obtained from a separate battery.

Let's go through the chain of operation again with the aid of Fig. 2. Starting at the control button (A) a command (bell on) is sent by pressing the button and holding. The transmitter (B) is, therefore, switched on and sends out a radio signal (called a carrier wave) for as long as the control button is held on. The radio receiver (C) now picks up the signal which is detected. This means that the signal is converted into D.C. (direct current) either by the receiving valve or transistor itself, or by a separate detector valve or transistor. The D.C. signal is, however, very small and may have to be amplified by further valve or transistor stages until it is strong enough to operate the relay (D). The contacts (E) on the relay then close and pass current from the battery (F) to the electric bell. The circuit is completed in just the same way as it would have been using long wires.

When the CONTROL BUTTON at the transmitter is released, the radio signal is stopped. Since there is no signal at the receiver to be detected and amplified there is no current passing through the relay coil. The relay will, therefore, open and cut off the electric current supply to the bell. Thus, by a radio control link, an electric bell can be set ringing anywhere within radio range. A model boat or aircraft can be controlled in exactly the same way without wires between the model and yourself.

Steering Control

The first and most important function is steering and for this we use a STEERING ACTUATOR (sometimes called a servo-mechanism). The most simple steering actuator has a moving claw that engages with a rotating arm which can be powered by twisted elastic (similar to the method used for powering model aircraft propellers) or by means of a small electric motor.

As in Fig. 3A the rotating arm is normally held stationary and in this position the steering is neutral (straight course).

When a radio signal is sent, current is applied via the relay contacts to the actuator whereupon the armature closes inward thus releasing the rotating arm which moves round a quarter turn as in Fig. 3B. It stops here because it is caught by the claw at the other end of the armature. By means of the mechanical linkage the steering has now been moved to provide a LEFT TURN and so long as the radio signal is 'held on' will remain in this condition.

When the radio signal is turned off, the armature will open again and release the rotating arm. This will now take another quarter turn and restore the steering to NEUTRAL as in Fig. 3C. Another radio signal will again operate the actuator and the process will be repeated, but this time, due to the mechanical linkage, the steering will be set for a RIGHT TURN as in Fig. 3D and remain so whilst the radio signal is held on. When the signal is turned off again, the steering will once more return to NEUTRAL.

So here we have a 'sequence' which means that one particular operation or command must follow another. In this case it is: radio off—steering neutral; radio on—steering left; radio off—steering neutral; radio on—steering right; and, finally, radio off—steering once more neutral. The sequence then repeats.

This very simple form of steering control is adequate for small model aircraft and boats but in recent years has been much improved upon by clockwork and electrically driven actuators. These have the same sequential steering control but in addition, allow control over an electric driving motor. One of these, the Kinimatic actuator shown in Fig. 4, will be featured in a radio-controlled model of a Chris-Craft Constellation motor launch I shall be dealing with next month.

Meantime if you would like advance details about this beautiful model and its radio control equipment call at your local model shop or write to: *Ripmax Limited*, 80 *Highgate Road, Kentish Town, London, N.W.5.* Ask for the Graupner catalogue plus the leaflets on Macgregor Radio Control equipment mentioning the article in M.M.

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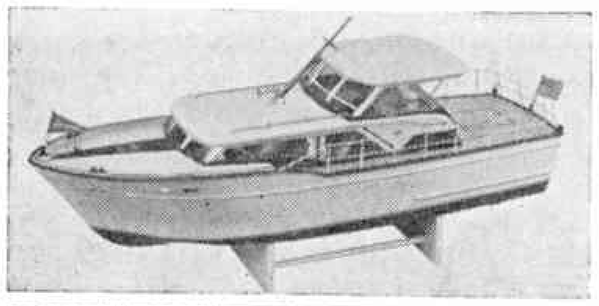
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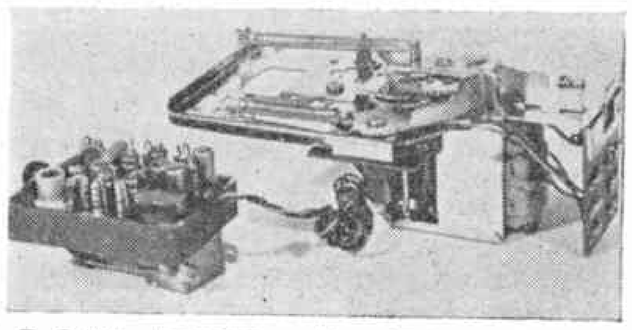
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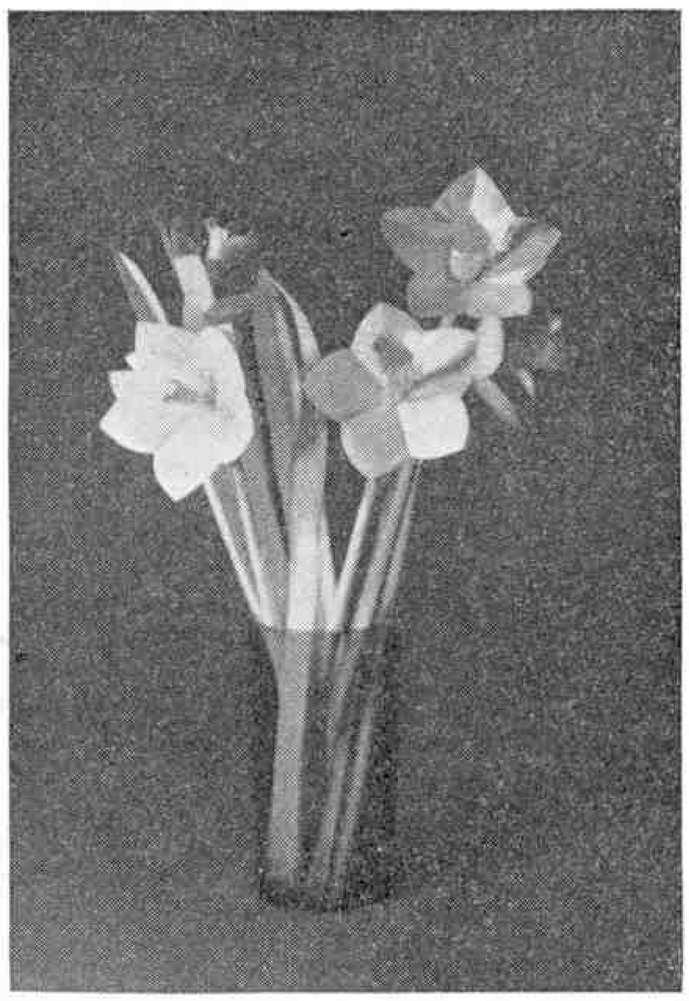
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by **Martin Jones**

Making Daffodils



IN the November issue of Meccano Magazine, I introduced you to the technique of making flowers in paper. To give you a further grasp of this subject, I am going to show you how to make daffodils. Not only are the daffodils more regular in the formation of their petals, they also have a simpler shape for the stalk and this is where you will notice the difference in the technique of their construction. The bunch in the picture above took forty-five minutes to make and cost less than sixpence.

Four parts

Like most other flowers of the same species and shape, daffodils can be constructed in four parts. The petals, the eyes, the stalks and the leaves. Each of these is made separately and then assembled.

Basic shapes

You will need to cut the basic shapes out of paper as shown in photograph 1. Diagrams 1 to 4 give you all the dimensions. A tip on saving time and effort is when you are making more than one object of the same shape, all the cutting can be done in one operation, all the scoring in the other, and so on for all the operations involved. For example, if you decided to make six daffodils, you will need six each of all the shapes shown in photograph 1.

All you need to do is to fold a sheet of paper six times over, make your drawing on the top and then cut the whole lot out in one go. This does not apply to quadrant shape for the eyes. You can easily make four of these at the same time by dividing a circle into its four quadrants.

Construction

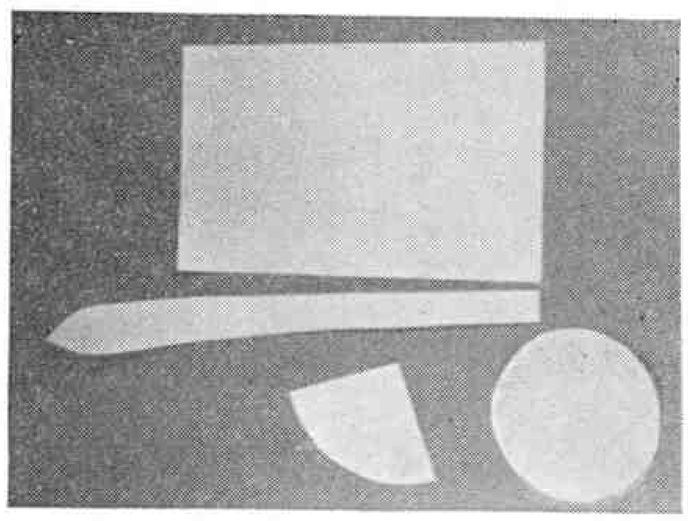
Follow diagram 1. The areas shaded in line should be cut out as waste. Score along the continuous thin lines on the front and on the reverse side along the thin dotted lines. Next, cut along one of the dotted lines and cut out a small hole in the middle for the eye. Fold away from the scores. Assemble the petals by securing one of the end petals on top of the other with clear glue.

Cut along the thick radial lines in diagram 2 and roll it into a conical shape (see photograph 2). Secure it with a piece of transparent sticky tape. This is the eye of the daffodil and can be assembled to the petals by inserting it into the hole provided for this purpose in the petal construction. Having positioned it accurately, it can be secured to the back of the petals with sticky tape.

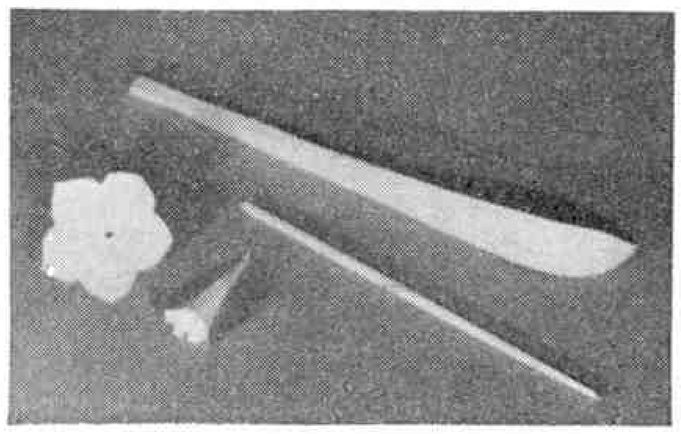
The stem is rolled out of a blank sheet of ordinary writing paper. The base of the cone of the eye is then inserted into the thin end of the stem and secured with transparent sticky tape. The leaves are easily made out of the shapes shown in diagram 4. They are scored and creased in the middle and slightly rolled at the top.

Adaptations

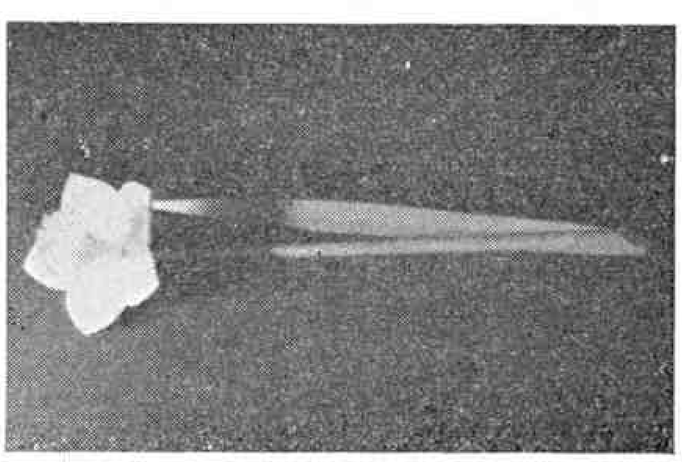
Having made a number of daffodils by following this method, I am sure you are now well-equipped with the technique of making flowers of most shapes. Combining a little ingenuity with adaptation of the above method to a particular shape, you can provide yourself with hours of interesting and entertaining modelling.



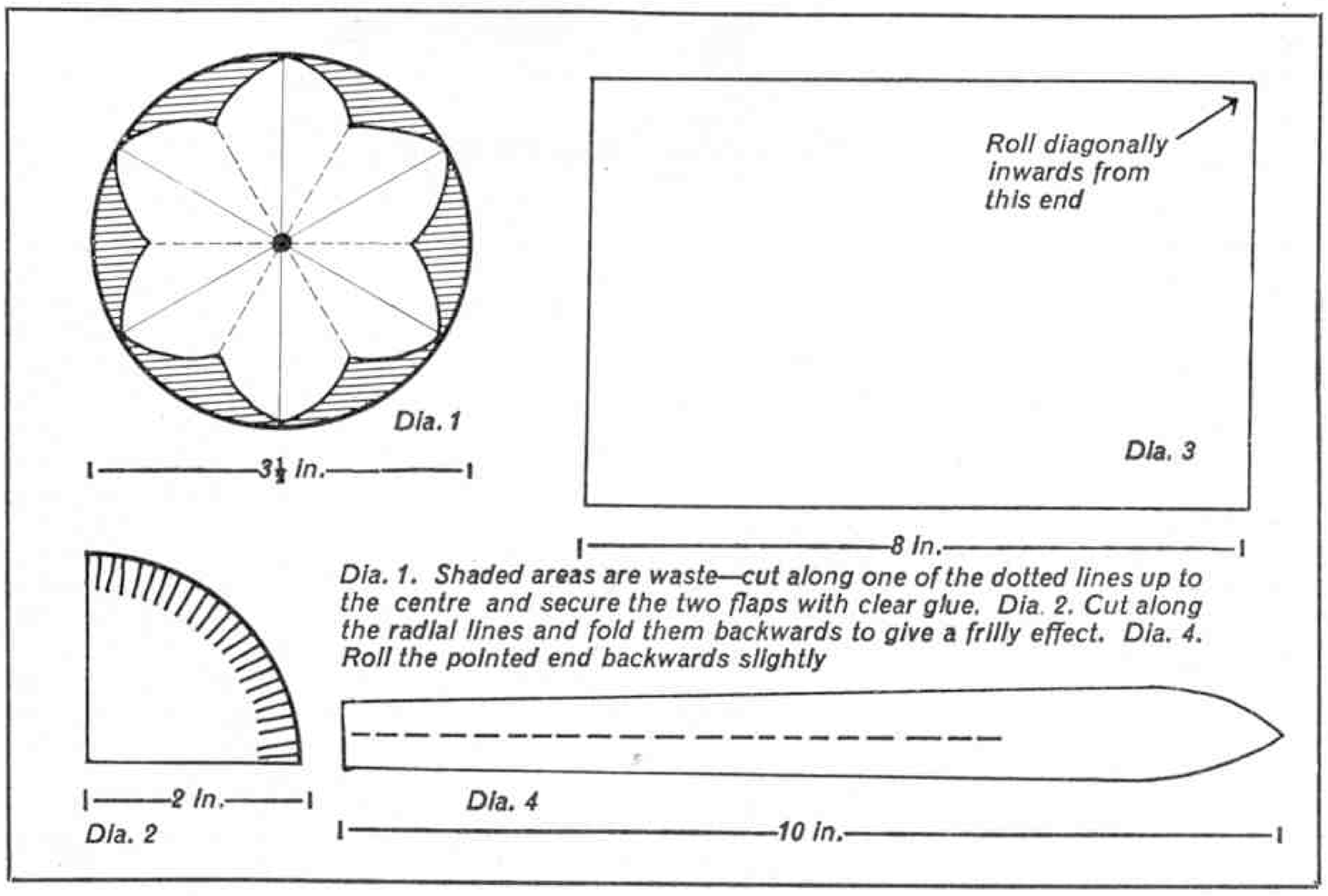
1 *All the units that go to make a daffodil*



2 *Each unit folded and ready for assembly*



3 *The daffodil complete with leaf and stem*



Dia. 1. Shaded areas are waste—cut along one of the dotted lines up to the centre and secure the two flaps with clear glue. Dia. 2. Cut along the radial lines and fold them backwards to give a frilly effect. Dia. 4. Roll the pointed end backwards slightly

DOUBLE TROUBLE

Sabotage at a secret aircraft establishment! Can Martin Tracy find the cause of the explosion which wrecked the Z-22 Rocket fighter?



'HERE she comes!' The normally volatile Digger Ames stood rooted to the edge of the landing strip as a speck on the horizon heralded the final run-in of the Z-22 Mach 4 rocket fighter.

The man standing next to Digger said nothing—he had seen the aircraft two seconds earlier. But that was typical of Martin Tracy. His uncanny ability—almost a sixth sense—for locating a target of any sort had earned him rapid promotion in the war-time Royal Air Force, culminating in the command of 781 Special Mission Squadron.

The hand-picked fliers, with their specially adapted Mosquitoes, had been a constant menace to the Luftwaffe in France. Their last operation had probably as much to do with winning the war as any other single campaign. Led by Martin Tracy, every 'plane in 781 Squadron had flown 400 miles into Germany at tree-top level to plant incendiary bombs into the heart of the Heinkel factory, where a deadly, new guided missile was being mass-produced.

With the loss of the stocks of the missile and the complete destruction of the factory, Germany's last hope of a smash-victory ended. Tracy's squadron was the first to be equipped with jets and peace found him with the rank of Group-Captain in charge of a fighter-bomber group based at Biggin Hill.

But a man like Martin Tracy soon became bored with administrative work. He fretted for the fever-pitch excitement of combat flying and when furious applications for an active posting to Korea were turned down by the Air Ministry, who maintained his experience was of more value at the Advanced Combat Training Wings then being set up, he reluctantly resigned his commission and turned freelance.

His wartime navigator, Digger Ames, joined him and the two formed a team acknowledged to be the best in the world. Nothing was lightly turned down by the pair and as a freelance flying team, their motto was 'We fly anything—anywhere'. Their skill and this search for adventure had led them to the works of Rocket-Aviation Ltd., and a job which promised to be extremely dangerous and a challenge to Martin Tracy's skill as a pilot.

The company had designed a new rocket fighter capable of speeds up to Mach 4 or about 3,000 miles-an-hour. It was the biggest single step forward in aircraft design since the original Whittle jet and, provided its proving flights were successful, the aircraft would be ordered in quantity for the NATO air arms all over the world.

Two prototypes had been built—one to be flown by an R.A.F. test-pilot and the other by Tracy, acting for Rocket-Aviation. The first of the two machines was now blasting over the aerodrome at something like 1,000 miles-an-hour.

Martin and Digger whipped round as the Z-22 shot over their heads—then it happened. The whole machine vanished in a searing ball of fire that was followed almost instantly by the last screaming whistle of its flight and a thunderous explosion.

'Quick! the rescue-chopper!' snapped Tracy as he raced towards the vivid scarlet helicopter, standing at the edge of the landing strip. Quick as he was, Martin never reached the machine. The emergency siren was howling and, above it, came the blare of the Tannoy ordering him and Digger to report to the control tower.

Martin tore up the stairs, three at a time, leaving Digger puffing far behind him and entered the control tower main office still breathing normally. He lit a cigarette and waited for a grey-faced Air Commodore to speak.

'Tracy', began the officer. 'You are, of course, flying the other Z-22 tomorrow. Or rather, you were.'

'Were?' queried Martin, astonished at this change of programme, which he knew to be vitally important to the aircraft company and the country as a whole.

'Yes', replied the Air Commodore. 'There is going to be a long delay before the Z-22 flies again. Something very unpleasant happened out there a few minutes ago.' He moved across to an enormous panel of instruments and tapped a tape-recorder fixed to one side.

'All through the flight, the instruments in the machine were tele-metered down here and everything was working perfectly. The pilot's commentary was recorded as well and there is no doubt whatever that the aircraft was sabotaged.

'Unless we—or you—can find how the machine blew up, the test tomorrow must be cancelled because it is obvious that the saboteur will have tampered with the second fighter', continued the officer.

Martin ground his cigarette out slowly. 'There's 24 hours before the second flight is scheduled, sir. If the trouble can be traced and fixed in that time, can the test go ahead?'

The Air Commodore nodded agreement. 'But I want a 100 per cent proof,

Tracy. And I would also like a strong lead on the saboteur as well.'

'Right', snapped Martin. 'Come on, Digger. We're going to be busy.'

The first check was obviously the security arrangements at the works, and it was difficult to see anything wrong. Chief Security Officer, George Taylor, had perhaps the finest record in the country. Ex-Royal Marine Commando, D.C.M., D.S.M., M.M., and a whole string of other decorations, plus an irreproachable civilian record — there could be no doubt about Taylor's loyalty.

And the men under him were almost as good. Hand-picked to a man, they would guard any part of the factory with their lives.

Nevertheless, the 'plane *had* been sabotaged and it could only have been sabotaged somewhere in the factory.

'Well, Digger', grunted Martin. 'There's no hope for it. We'll have to go through all the personnel files of every man concerned with the Z-22.'

Digger groaned. Breakfast was a long way behind him and he knew what Martin Tracy was like once he got his teeth into a problem. He would be lucky if he had a sandwich for his lunch!

The two settled down with a huge pile of files that covered the lives of all the men on the project—and all those other men who were connected with supplies or parts for the aircraft. The afternoon dragged by as the two men checked and cross-checked. Then Martin yawned and rose to his feet.

'Come on, Digger', he grunted, 'let's have another look round outside. I'm getting stale in here.'

Jerrican out of place

First call was at the hangar where the Z-22 was stored. Seven challenges had to be answered before the two men stood inside the brilliantly lighted area round the Z-22. Chief Taylor walked up, saluted and spoke to Tracy.

'Doubled the guard tonight, sir, and we brought the fuelling tanker in, too.' He indicated a bright yellow tanker standing just behind a low blast-wall inside the extreme end of the hangar.

Martin walked slowly round the aircraft while Digger chatted to Taylor. Armed men stood everywhere round the 'plane and it was obviously impossible for anybody to approach it undetected. Nothing had been forgotten, but there was something that made Martin look twice—a five-gallon jerrican standing on the floor.

He looked quickly round to where Digger and Taylor were still talking then stooped down and opened the jerrican. It contained water. Martin shrugged. Water is found in every aircraft hangar and there was no reason at all why it should not be there. He returned to Digger noticing with faint interest the effect the brilliant overhead lights had on Taylor's black uniform. A faint sheen came from the cloth which shimmered slightly as Taylor turned towards him.

Suddenly, Tracy's eyes narrowed. He looked closely at Taylor for a second and then beckoned Digger. 'Come on, lazy', he grinned, 'back to work.' Outside the hangar, Martin's cheerful smile vanished. In a few crisp sentences, he gave Digger orders that sent that worthy sprinting to the car park as fast as he could run.

Three hours later, when the guard was changed at the hangar, Martin went back and made a few alterations that nobody except the corporal of the guard saw. And the corporal was a man who served in the R.A.F. Regiment unit that had guarded Tracy's runways in the days of the old 781 Squadron.

Work starts early on test-flight day and just as dawn was breaking, the Z-22 was towed from its hangar by a tractor. Slowly it was pulled to a blast-proof compound where it was joined a few minutes later by the fuelling tanker.

Fuelling a rocket-powered aircraft is a tricky job. The fuel is so volatile, it must not come into contact with the air or it may blaze up. Special armoured hoses connect the tanker to the 'plane and low-pressure nitrogen forces the fuel along the pipes. When it is all delivered, special valves on the aircraft tanks slam shut.

Neutralising liquids then swill along the pipes to 'kill' the last traces of the rocket fuel. Only then is the aircraft towed out to dispersal.

Martin climbed the alloy ladder and settled himself in the huge ejector seat of the Z-22. He clipped his safety buckles to the seat, adjusted his helmet and switched on the radio. It took 40 minutes to carry out the pre-flight check, then Martin Tracy pressed the button that sent the cockpit cover hissing forward to lock tightly closed.

A wisp of smoke curled from the rear of the 'plane, followed by a searing tongue of flame that increased in length as the scream of the exhaust climbed up the frequency scale. Slowly, ever so slowly, the aircraft rolled down the runway. The flame grew even longer and the noise more piercing as the rocket warmed up, then the 'plane surged forward. Sixty miles-an-hour . . . ninety . . . over the hundred . . . then the fighter leaped off the runway.

Up it went in a near-vertical climb at a speed that astonished even Martin, who had been largely prepared for it.

Martin's eyes flickered continuously over the banks of instruments and he kept up a running commentary as the Z-22 howled skywards.

The altimeter registered 100,000 feet when Martin pulled out of the climb and eased the throttle back to keep the aircraft on a level course at a height where there is not enough air to support an orthodox aircraft.

The Z-22 kept flying solely because of the power of its mighty rocket motor. At that fantastic height, Martin could see the curvature of the earth below him and the black depths of outer space above him. It was a cold, quiet, unfriendly place where anything could happen. . . .

Martin shivered slightly and shook off his brief day-dream. The biggest test any aircraft has to undertake was coming —the power dive. He eased the control column forward and opened the throttle until the Z-22 was standing on its nose and diving under full power. The needle on the mach-meter rose higher and higher . . . 1·5 . . . 2 . . . 2·5 . . . 3 . . . 3·5 . . . 4 . . . coming up to five times the speed of sound. As the needle climbed to the Mach 5 figure, Martin glanced anxiously at the wing-tips of the fighter. They were glowing a dull red as the aircraft came into the dreaded heat barrier.

The altimeter dropped fantastically as the Z-22 screamed earthwards. Then, at 10,000 feet, the automatic levellers cut in with a whine of servo-motors.

Martin's ejector seat hissed down on its rams as the gravity pull cut in and imperceptibly, the aircraft began to level out. The fantastic strain set the wings quivering so violently they became blurred. Dive-brakes eased out from the fuselage and at 5,000 feet, the 'plane levelled out.

The test-flight was finished except for the final run across the aerodrome. And it was at this stage that the first aircraft had blown up. . . .

The flight-programme called for a final run across the runway, but Martin had something else in mind. He straightened up at the end of the runway and lowered the flaps, then the wheels.

A small group of men were standing at the end of the runway and as the Z-22's wheel's bit the tarmac with a squeal of rubber and spurts of blue smoke, one of those men turned and ran.

Martin grinned as he watched him because Digger was right after him—and so was Corporal Snelling with his police dog, Flash. By the time the fighter had stopped, Digger and Snelling had dragged the snarling dog off—Taylor.

Back in the control tower, Martin gratefully puffed a cigarette.

The Plot revealed

'I first realised something was wrong when I saw the jerrican full of water in the hangar', he said. 'There was no reason why it shouldn't be there, mind you, but it seemed a little odd in such a special place. Anyway, it set my mind working hard and when Taylor turned round, I was all set to spot any fault, and I did. Taylor's M.M. ribbon was upside down and that is something a man like Taylor would never allow.

'The point is that Taylor *isn't* Taylor! The real Taylor has been murdered, or perhaps kidnapped, and this man, his double, was planted in his place. I suspected this when I found a three-month gap in his file last night. He was supposed to be on a long holiday in France with an old Resistance friend, but I could not find any details of this Frenchman.

'Anyway, Digger here organised the refuelling and Corporal Snelling, while I switched the jerrican of water for one full of jet fuel and had the fuel lines in the aircraft changed.

'You see, the idea was that "Taylor" tipped the four gallons of water into the fuel for the Z-22 when nobody was looking. The water does not mix with the rocket fuel and when it emerges as a "bubble" of water into the white-hot exhaust cone, it is changed suddenly into steam. The steam expands at a terrific rate and causes a flame blow-back which ignites the last drops of fuel and gas in the 'plane's tanks.

'The jet fuel mixed quite well, but Taylor did not know of the change and was scared stiff in case the Z-22 blew up on the tarmac where I had landed earlier than scheduled. The rest you know.'

Martin stood up. 'Come on, Digger,' he grinned. 'We can just about grab ourselves a decent dinner and then a nice B.E.A. flight to Dortmund. We're taking the new VTO airliner up tomorrow.'



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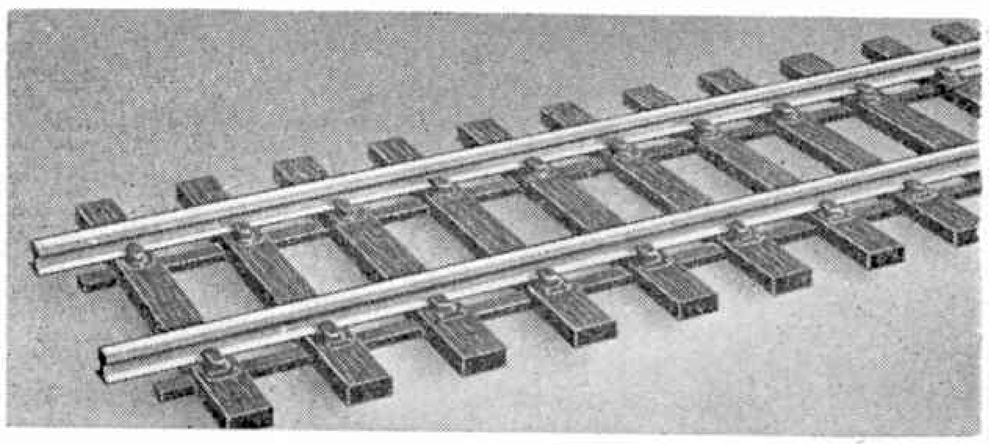


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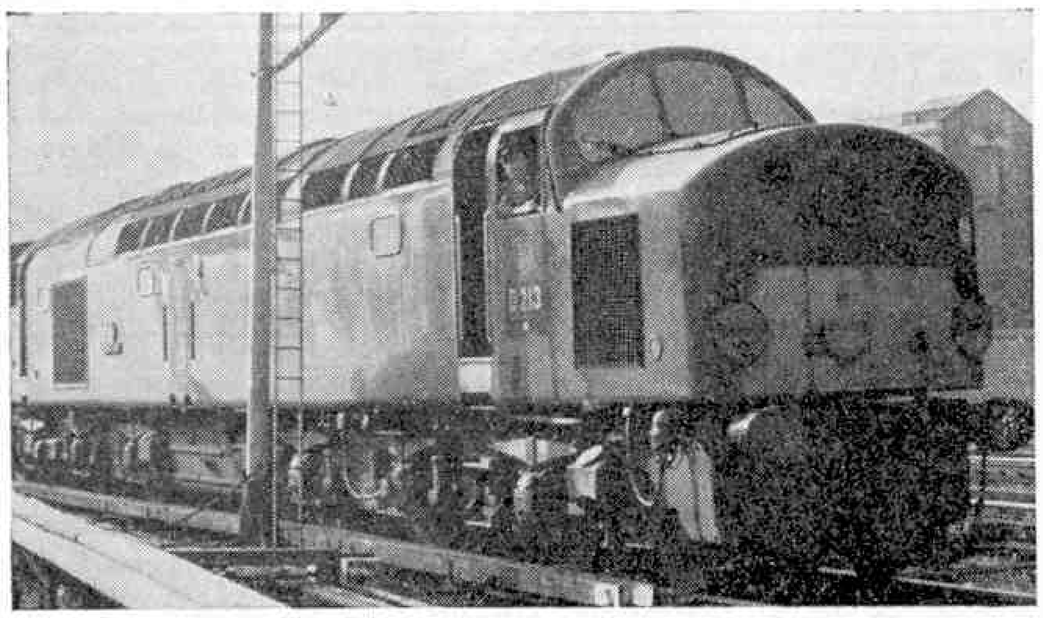
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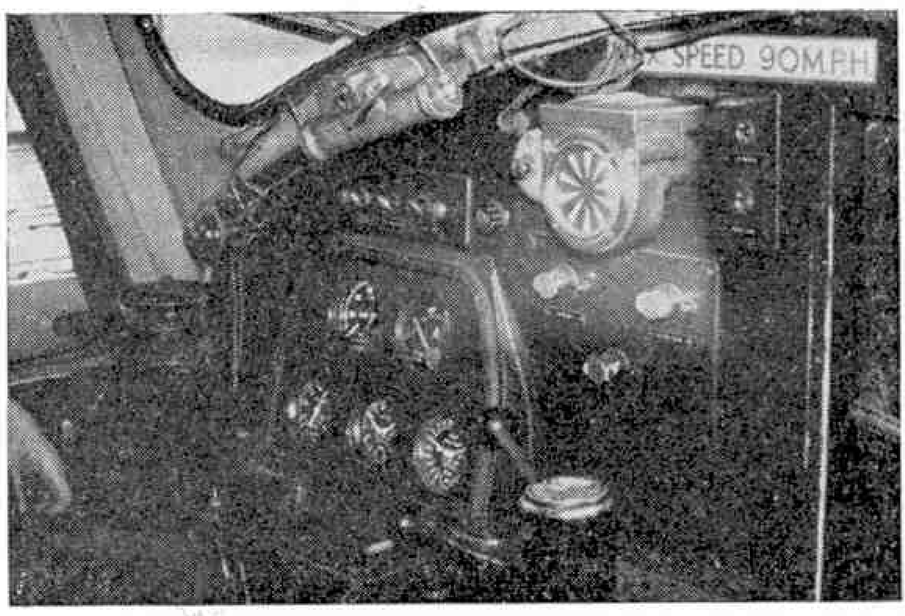
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(Left) *English Electric Co-Co type 4 diesel electric locomotive D213 'Andania' leaving Liverpool Exchange Station*

(Right) *The control cab. The A.W.S. visual warning equipment can be seen at the upper part of the picture. slightly to the right. The main controller is below this, and the vacuum brake equipment can be seen on the left of the photograph*



RIDING THE FOOTPLATE

by **Michael Rickett**

SINCE the introduction of the modernisation scheme, the once large fleet of steam locomotives owned by British Railways has been systematically replaced by modern forms of motive power.

The diesel locomotive, although originally intended to be a stop-gap between steam and electric power, has earned itself a prominent and important position on the new railways. Contrary to popular belief, however, diesel locomotives are not a recent introduction. In fact, their history can be traced back to 1876, when Dr. N. A. Otto developed an efficient gas engine. Eight years later, Gottlieb Daimler produced his first petrol engine and in 1886-90, James Ackroyd Stuart took out patents for the development of the compression-ignition oil engine.

Dr. Rudolph Diesel entered the field six years later by introducing a fuel consisting of coal dust and oil, which was forced into the engine cylinder by an air blast. This type of fuel was abandoned, to be followed by oil only, which was injected into the engine cylinder in the form of a fine spray. This final development was the predecessor of the modern diesel engine as we know it.

Three categories

Basically, the diesel locomotives in service on British Railways, fall into three different categories—diesel electric, diesel hydraulic and diesel mechanical. Diesel electric locomotives are driven by electric motors in a similar way to the 25 kV. locomotives used on the Liverpool-Euston route. They differ, however, in the respect that the electricity, instead of being collected from a catenary, is generated in the locomotive by a diesel generator.

Recently, I travelled on the footplate of a diesel electric locomotive, one of the powerful type 4 Co-Co diesel locomotives developed by the English Electric Company. On the occasion of my trip it was working the 9.50 a.m. train from Liverpool Exchange Station to Preston. The locomotive was D213 'Andania', and Driver D. Roberts, of Bankhall, was in charge. Inspector F. Joslyn was also on the footplate and his helpful comments along the route were greatly appreciated.

The train left the station at 9.50 a.m. on the dot and accelerated swiftly up to 25 m.p.h., which we were not allowed to exceed up to Sandhills No. 1 box, because of a signal check along the station approach lines. The speed restriction ends just beyond the overbridge outside Sandhills Station, where I became conscious of the splendid running qualities of the locomotive. I was pleasantly surprised to find that I was able to write my notes with little or no hindrance since there was no perceptible swaying by the locomotive. It was, I found, a considerable improvement on the rocking one experiences on most steam locomotives—especially on tender engines.

At speed

The train was allowed to accelerate unchecked until Walton Junction, where a speed limit of 75 m.p.h. maximum is in force. Walton Gaol, of Z Cars fame, could be seen on the left as we sped through this junction and shortly afterwards we passed Orrel Park at 40 m.p.h.

The train travelled over the lines formerly owned by the Cheshire Lines Committee to Southport (Lord Street-Liverpool Central). Our speed dropped to 15 m.p.h. as Aintree Station was approached. The famous Grand National course could be seen on the right.

As we approached Old Roan Station our speed had by this time increased to 54 m.p.h., although a 75 m.p.h. maximum was in force on this stretch of line. The rather steep gradient before Maghull Station had a slowing effect on the 365 tons, 11-coach train. The rising grade—the steepest is 1 in 67——kept our speed down to a steady 54 m.p.h. We were confronted, after leaving Maghull Station, with a severe distant signal check before Town Green Station, which was unfortunate because the steepest part of the grade lies just outside this station. Our speed recovered slowly, once outside the station and we passed Aughton Park at 30 m.p.h. and Ormskirk at 40 m.p.h.

The previous signal check had made us three minutes late, but as the gradient began to fall just beyond Burscough we were able to increase speed, and eventually recover the three minutes that we had lost. As historic Burscough Abbey came into view, Driver Roberts notched the train up to 65 m.p.h. and we travelled the mile to Burscough Station in record time. Shortly beyond and to the left, lies an Army Ordnance Depot and also several flour mills and on the right runs the Manchester-Southport-Wigan line.

Just beyond this point lie Rufford water troughs, over which we travelled at a speed of 75 m.p.h.—the maximum permissible along this stretch of line. Although the water troughs were primarily built for the use of steam locomotives, the English Electric type 4 diesels also have occasion to pick up water at speed for the train-heating boiler. The type 4 is one of few diesels to be so fitted.

Rufford Station was later passed at maximum speed: picturesque Rufford Hall lies a little to the left. We ran on at maximum speed and I was able to study the typical Lancashire countryside, looking most attractive in bright sunshine. We travelled swiftly over the River Douglas, still at maximum speed. The flat, green farmlands stretched out on both sides for mile after mile. The sense of isolation was accentuated by the wind whistling through the windows of the cab, and the diesel engines throbbing steadily behind us.

All signals were at clear as we approached Croston Station, and maximum speed was maintained, although as we neared Midge Hall our speed dropped to 70 m.p.h. and I noticed that our time was 19½ min. This rate of progress was drastically reduced when a permanent speed restriction of 15 m.p.h. outside Midge Hall to Moss Lane through-junction was met. Our next restriction would again be one of 15 m.p.h. at Torrington Junction, which is near the junction with the former London and North-Western line to Glasgow. The three minutes we had previously lost because of the signal check had been regained, and we were on time as we passed over the slow line to Preston.

As we crossed the bridge spanning the River Ribble I could see the former Lancashire and Yorkshire Railway line on the right. We came to a halt exactly on time.

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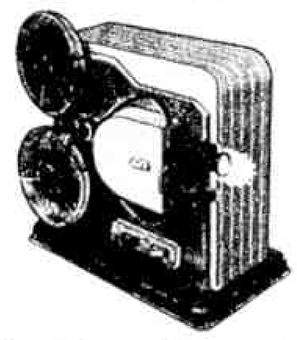
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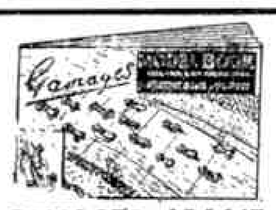
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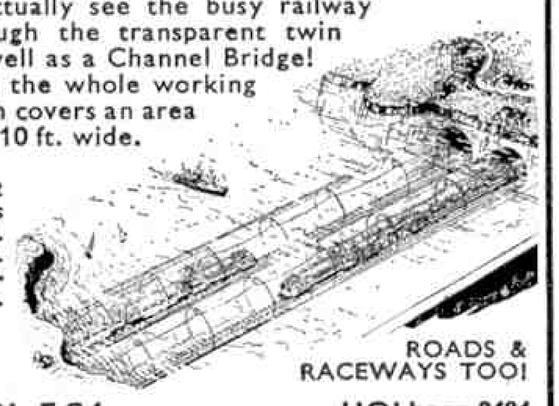
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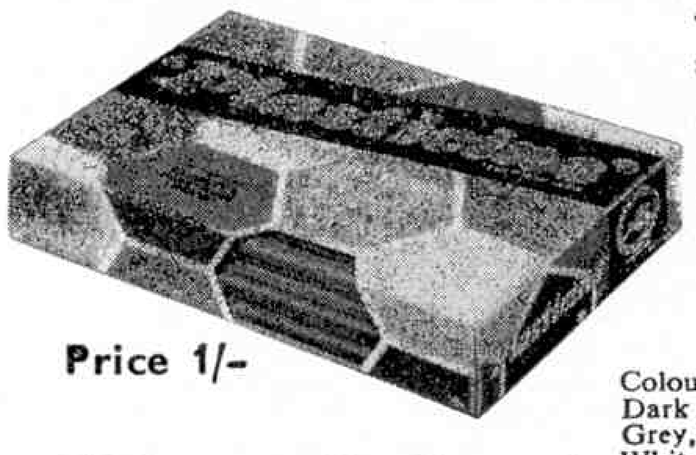
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STAMPS

by **F. E. Metcalfe**

Gifted Country

I SUPPOSE a number of readers will remember the huge success of the opera company from Czechoslovakia at the Edinburgh Festival this year. It was an eye-opener to many but not, perhaps, to those who know the high standard of the arts in that country. You can see it even in the postage stamps they issue from time to time. The designs are not only original, but quite frequently really outstanding. Take, for instance, the set of four issued earlier in the year (March 20 to be exact) marking cultural anniversaries. I am selecting this set because our own William Shakespeare was included in the issue.

Originality is the keynote of most Czech stamps, but they manage that difficult feat and still produce designs which are not an insult to one's intelligence, as are so many of the so-called works of art produced nowadays. If there are any readers looking for a new foreign country to take up—then take a look at Czechoslovakia. I think you will be really charmed with what you find and, perhaps of equal importance to most of us, the modern issues of that country do not cost the earth (1).

Our own field

What I have written about Czechoslovakia is true enough, but I must not neglect our own stamps, for Commonwealth collectors are very interested in the stamps of our own Commonwealth, and there is plenty in this field to keep us busy, with new special issues for one country or another appearing all the time. This is to be expected, of course, with so many member states involved. Fortunately, the sets are mostly inexpensive and are very attractive compared with the pre-pictorial issues of former times. I know that a few old-timers like myself occasionally pine for the so-called key-plate issues of the KGV reign (the stamps just showing the head of the monarch), but I also remember how bored we were when the stamps were appearing and how delighted we were when the early pictorials replaced them.

A set which has charmed the junior collectors, at any rate, was the one issued for Pitcairn Islands in August. The designs may lack art's finer points, but it is nevertheless a jolly fine set and collectors have gone for it in a big way. But that is only one Commonwealth issue which is right up in the top ten of philatelic popularity (2).

First day covers

One of the features of the Commonwealth QEII Catalogue, recently issued in the 1965 edition, has to do with first-day covers of all special issues. It is quite a surprise to find so much interest being taken in those listings, considering the moderate response when the feature was first introduced three years ago. But since then, of course, there have been big changes. A new departure for both our own Post Office and the Crown Agents, who handle postal issues for more than 60 Commonwealth countries, is to provide first-day covers with an official status.

The Crown Agents, as is always the case with everything they undertake for collectors, are doing a wonderful job, for dealers are thus able to supply collectors with nice items at reasonable prices. I would suggest that collectors might do very well for themselves by picking up these covers before the inevitable rush begins.

Cylinder blocks

'Whatever are these?' a new collector might ask. But collectors of our own British stamps of the present reign know well enough what they are, for on the special issues which our Post Office is putting out with such regularity in these days, you will find on the selvedge the letters and numbers of the cylinders used for printing the stamps—in the colours of the stamps, of course.

Corner blocks showing these selvedge markings have become so popular that they have been listed for the first time in the Commonwealth QEII Catalogue, and their inclusion may have had something to do with the tremendous sales which the 1965 edition has enjoyed.

But regarding the cylinder blocks themselves, they are not difficult to obtain when the stamps themselves are current and, with a growing demand, they look like getting quite scarce. In fact, one dealer told me that when the catalogue appeared he sold the few he had and had not been able to buy any more, although a number of his customers were clamouring for them. So, when the next special issue appears, see what you can buy at the local post office.

Far away and long ago

The Falkland Islands issued a set of stamps on December 8, which were of particular interest to me, for they were to mark the fiftieth anniversary of the Battle of the Falklands. I was living in Patagonia at the time, in the small, windswept, tin-roofed port of Puerto Madryn (3).

A little while before that battle the 'Glasgow' (worshipped on the South American station, where she had been for some time) came into the bay, and took away fresh provisions, as well as cases of tinned fruit. How well, even to this day, I remember that brief visit, and how I appreciate this new set of stamps.

Tip of the month

Although there are so many stamps being issued, I have not been able to avoid referring quite a lot to those released from time to time by the United Nations' Postal Administration. Their stamps are always so topical and so well designed, since they can call on the world's finest artists for the job. In view of all this it is no wonder that UN stamps are popular (particularly in the U.S.A.) and while most of them are still reasonably priced, now is a good time for collectors who are looking for a new country (as so many are at the beginning of winter, when indoor pursuits call) to consider the postal issues of this great institution. I do not think I can give a better tip this month (4).

1



2



3



4



FITTING A DYNAMO

"SEE and be seen," is not strictly a cycling motto, but nevertheless, is very good advice for all who travel on two wheels. There should be no need to emphasise how vital it is that good front and rear lights are fitted if you are cycling at night. If you want a lamp that is always ready for use, that doesn't need battery replacements and that will give a good steady powerful light, you can't beat dynamo lighting.

The photographs on this page show the main steps in fitting a cycle dynamo. The position of the dynamo itself is important. A line drawn vertically through the unit should pass directly in line with the rear wheel spindle. The serrated driving wheel, when the dynamo is switched on to the wheel, should bear on the special dynamo track on the tyre. Make sure that the corner of the driving wheel is not digging into the rubber and that the whole of the flat serrated surface is in contact with the tyre.

If the cycle frame is being used as the earth return, the little pointed screws, provided with the dynamo, must be screwed in until they bite into the cycle frame. They will pass right through the paint on the surface and into the metal beneath.

The chief point to remember about the rear lamp is that it must be *clearly* visible from the rear. If it is not, a policeman may stop you. Even more important—if you can't be seen you may be hit by an overtaking car. For this reason, in our photographs, we have shown the rear lamp positioned on the rear carrier.

There is another grub screw here which will ensure good earthing. Another type of dynamo has a bracket extension on which the rear light is mounted—the one earth screw is then sufficient for both dynamo and rear light.

It is just possible that the carrier for some reason is not making good contact with the frame. If this or anything else causes a bad earth, you may find that the twin wire system shown below is worthwhile. As can be seen, the flex is divided and one side is connected in the usual way. The other wire connects front lamp to dynamo and rear lamp to dynamo, ensuring a positive earth return. With the neat modern twin flex this is just as tidy as the single wire system.

The routing of the wires is also important. At the headlamp end, the wiring must be kept loose. You can judge how loose by fixing in place and swinging the head of the bike to make sure it does not foul or become too tight. Take the wires along the frame by threading it under the cable clips, if cable brakes are fitted. If not, cable brake clips make a very neat fixing.

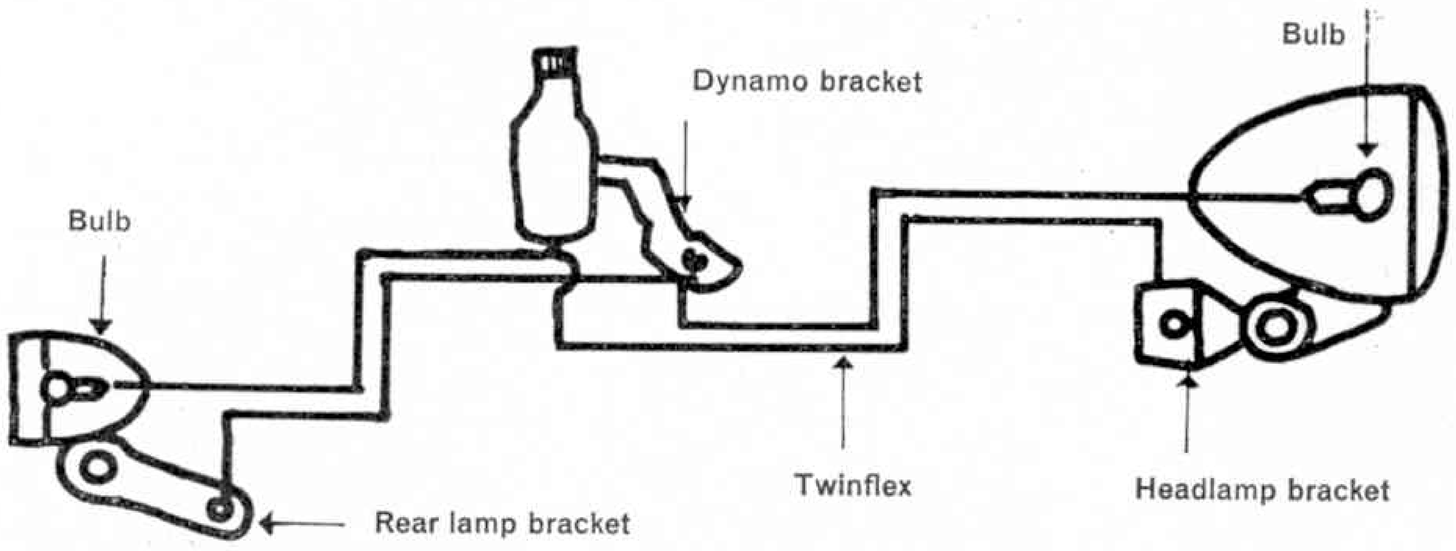
The actual connections are best made with brass spade connectors—you should be able to get these at your local electrical shop. They are less likely to come loose or fall off through vibration.

It is just possible that the headlamp bracket, if painted, may give a bad earth return. The trick here is to clean off the edges of the bracket with a piece of emery paper.

It is always a good idea to carry spare bulbs in your tool kit. Dynamo bulbs always seem to be more prone to "blowing" than battery lamp bulbs, so be prepared. The rating of bulbs for the Delite set shown in the photographs should be 6V., ·45-amp. for the headlamp and 6V., ·1-amp. for the rear. It is quite usual, however, for a 6V., 3 Watt dynamo to use a ·04-amp, rear bulb. Your local cycle shop should be able to advise on this.

Once working correctly, dynamo lighting is very efficient. Almost always any faults, such as flickering or intermittent lights, are due to poor connections somewhere, so take great care with these.

The dynamo, incidentally, can be mounted on the front forks if preferred but, wherever it is placed, the same points about alignment must be followed. If the dynamo cannot be positioned satisfactorily because it fouls the mudguard, you will have to cut a little piece out of the mudguard.



This diagram illustrates the twin-wire system of fitting a dynamo set, where one side of a length of twin-flex is used as the earth return. All photographs, except E, indicate fitting single flex systems.

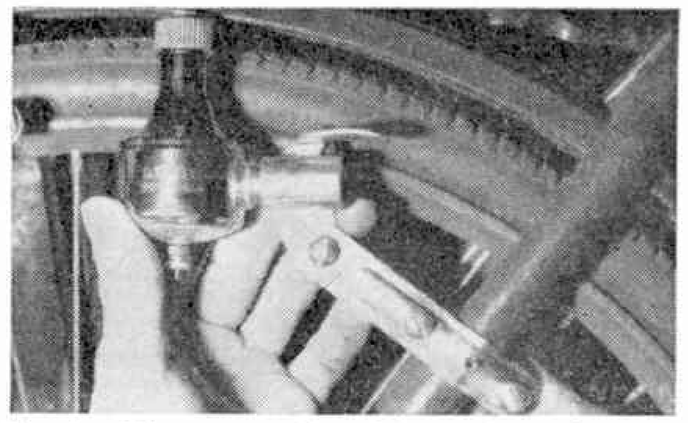


Fig A. There are at least two points of adjustment when fitting the dynamo. Slide the bracket up and down the stay and adjust the angle of the dynamo until the correct position is found.

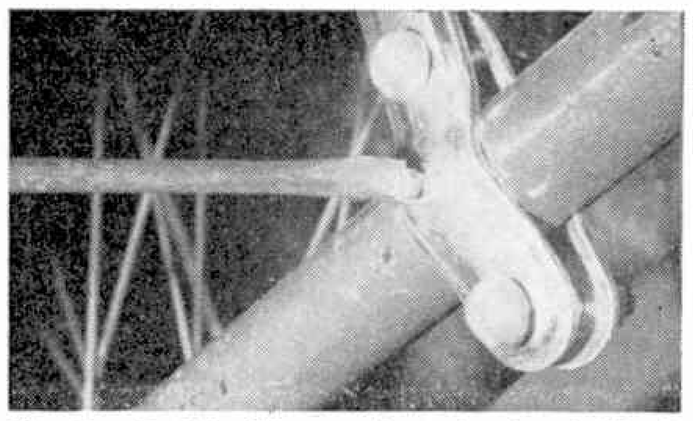


Fig. B. Earthing is very important and this is achieved in most dynamo sets through the cycle frame. Good contact between fittings and frame is assured by means of this pointed screw.

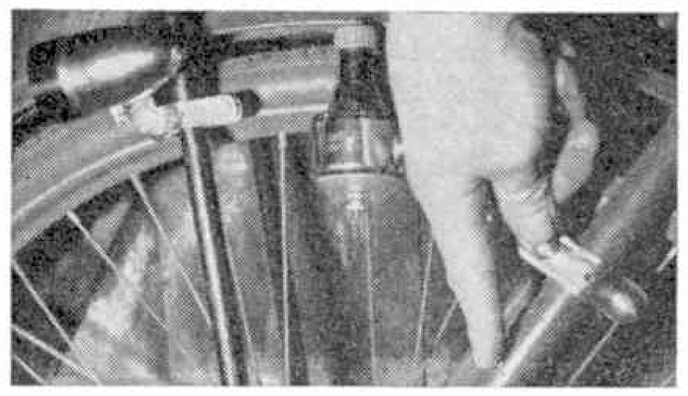


Fig. C The position for mounting the rear light is usually on the rear stays (pointing finger) but when a carrier is fitted and the support masks the light, fix the rear light on the carrier.

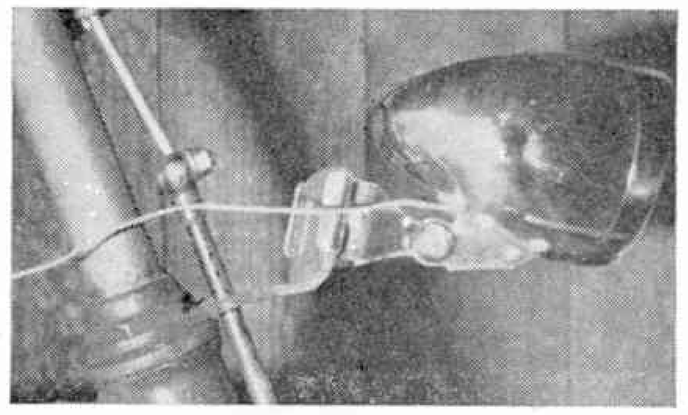


Fig. D. The headlamp position may be mounted on a bracket up by the head or down on the forks but in either case sufficient slack wire must be allowed to permit free steering. Adjustment is made to the headlight beam on the bracket.

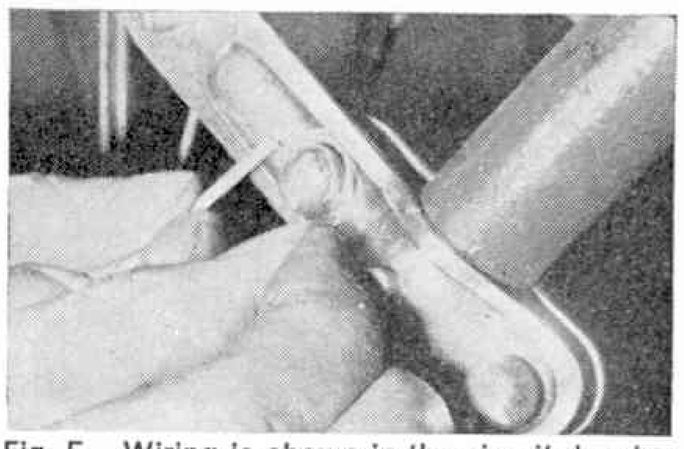


Fig. E. Wiring is shown in the circuit drawing, but here can be seen the method of securing the earth return when the twin-flex method is used. Twist stranded wire together and secure behind a bracket nut to provide a good 'earth'.

Meccano Coin Machine 36
Simple Meccano Models 38
Meccano Potter's Wheel 41
Dinky Toys' News 42
Round the Societies 44

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OPERATING BY TIMETABLE

by **Linesman**

IN several of my articles recently, I have mentioned that the operation of a timetable, in which the timing of train movements and schedules is precise, can make exciting demands on the skill of the operator, and will also add great interest to the average model railway. This month, I want to explain the various processes involved in compiling a working timetable suitable for an end-to-end layout having a set of hidden storage sidings. This differs from a normal railway timetable by including *all* train and shunting movements in any particular station, rather than presenting a record based purely on passenger train movements between one station and another.

One advantage of the end-to-end layout is that a train can leave the terminal station at the time indicated on the timetable and eventually disappear into a tunnel containing a number of storage sidings. These sidings can be used to represent the remainder of a journey, so that it is possible for you to draw up a fairly comprehensive timetable; in fact, you could have trains leaving for most points in the British Isles!

This system has been adopted by Mr. E. C. Parker of Maghull, near Liverpool, whose layout is illustrated in our photographs. Mr. Parker uses Hornby-Dublo locomotives —he has about 20 in all—and rolling stock and, as you can see, believes in the effective use of well-planned backgrounds. Perhaps at a later date I may have the chance to describe his layout more fully.

Remember that timetables cannot be drawn up haphazardly; in fact, you will invariably find that a great deal of careful thought will have to go into their compilation. Train services to and from the main terminal station should be planned so that they interlock. If, for instance, the railway you intend building is of a single branch line nature, it is obviously impossible to have one train leaving the terminus and another entering at the same time. The timetable must also allow for a specific number of trains in the storage sidings at any one time. Gaps must be left in the schedule to allow shunting operations to be carried out in the terminus, and also to give a second operator a breathing space to turn trains round in the storage sidings.

Before describing the timetable for the layout shown in Fig. 2 let me first describe the six different types of train to be used for the timetable I have compiled. The express passenger train can be formed from five, or possibly six, coaches of the following types, No. 4075 Passenger Brake Van B.R., No. 4053 Corridor Coach Brake/2nd, No. 4063 Open Coach 2nd Class B.R., No. 4052 Corridor Coach 1st/2nd B.R. and No. 4062 Open Coach 1st class B.R. The local passenger train can be formed from two or three coaches of the suburban types available from the Hornby-Dublo range. Coaches Nos. 4081, 4082, 4083, and 4084, are quite suitable. The push-pull train should consist of one coach, preferably either 4082 Suburban Coach Brake 2nd S.R., or No. 4084 Suburban Coach Brake/2nd B.R.

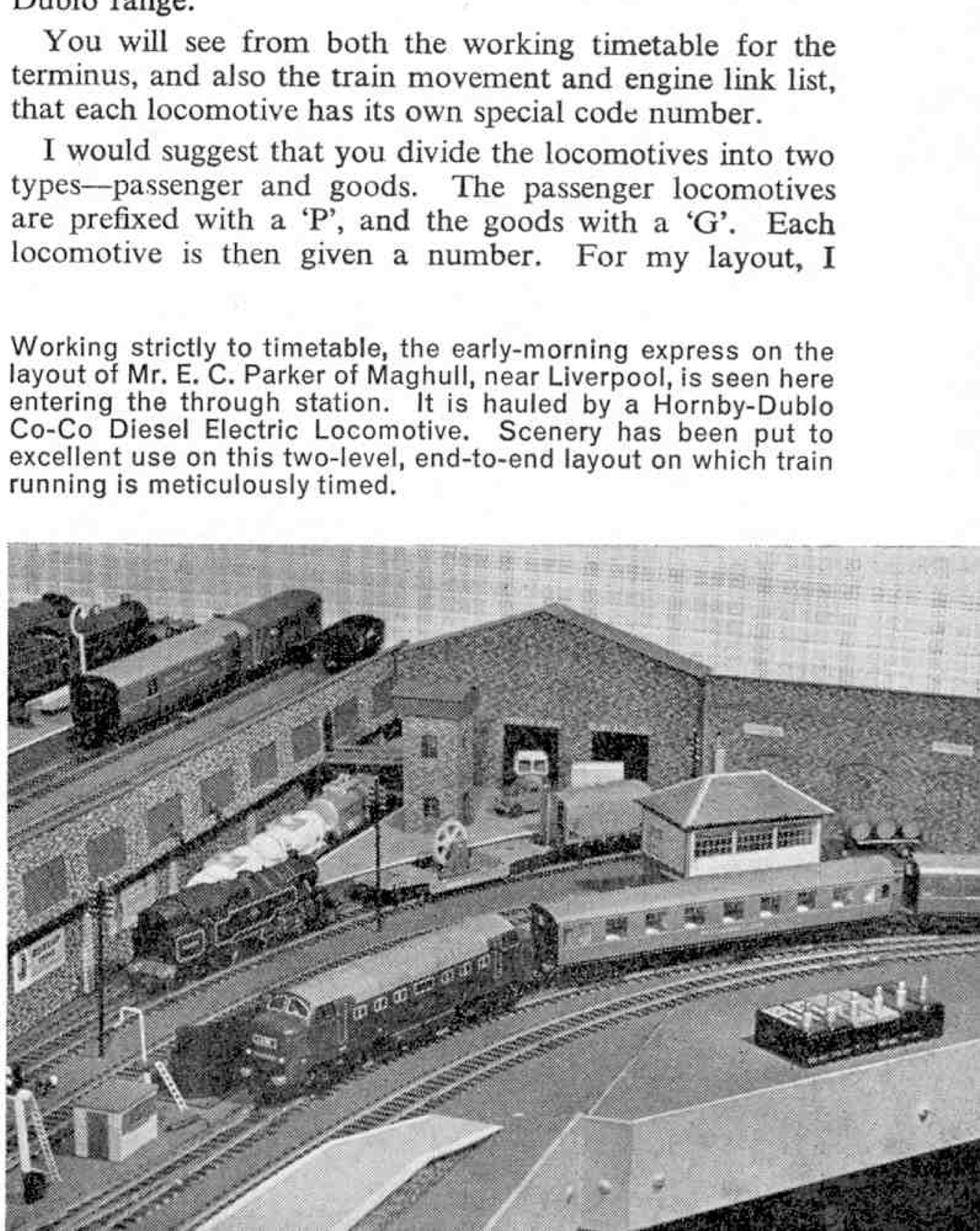
Most important train

Turning now to the goods traffic on the line, the most important train is the express goods. This should have a Brake Van—either No. 4311 or No. 4310, and a variety of wagons and vans of your own choice. Most of the goods vehicles in the Hornby-Dublo range are suitable. The only parcels train to travel on the branch can be formed from No. 4325, 12-ton Ventilated Van, and also a number of No. 4323 Four-Wheeled Utility Vans. A small number of goods wagons of No. 4640 Goods Wagon Steel Type can also be used, as can any of the three Hornby-Dublo Brake Vans. The remaining train is the pick-up-goods which, of course, can use any of the goods vehicles in the Hornby-Dublo range.

You will see from both the working timetable for the terminus, and also the train movement and engine link list, that each locomotive has its own special code number.

I would suggest that you divide the locomotives into two types—passenger and goods. The passenger locomotives are prefixed with a 'P', and the goods with a 'G'. Each locomotive is then given a number. For my layout, I

Working strictly to timetable, the early-morning express on the layout of Mr. E. C. Parker of Maghull, near Liverpool, is seen here entering the through station. It is hauled by a Hornby-Dublo Co-Co Diesel Electric Locomotive. Scenery has been put to excellent use on this two-level, end-to-end layout on which train running is meticulously timed.





Mr. Parker operating the comprehensive control panel

decided to use No. 2226 'City of London', No. 2218, 2-6-4T, No. 2217, 0-6-2T, and No. 2224 2-8-0. The passenger coaches should then be sorted into rakes or trains, and listed accordingly.

The first step when compiling a timetable is to make a sketch of the layout concerned (similar to that shown in Fig. 2). You will notice that every terminal line and siding has been given a separate number. This serves two purposes; the first is to act as a guide when compiling the train movements and engine link list, and the second to enable a specific destination to be given to each train. You will notice, on the working timetable for the terminus, that each train movement has a number after it. This number refers to the line from which the train is to depart, or on which it will arrive.

Major train movements

When the plan has been drawn, and numbers allotted for each road, a graph must be drawn (as in Fig. 1) showing each major train movement between stations. The abbreviations used on the graph are as follows: 'T' for terminus, 'TH' for through station, and 'S' for storage sidings. The abbreviations used for the trains themselves are: P-P—push-pull train, EG—Express Goods, LP—Local Passenger, EP—Express Passenger, PUG—Pick-Up Goods, P—Parcels.

When plotting trains on the graph, you must be careful to ensure that only three trains in succession arrive at the terminus, or alternatively depart for the sidings. Your layout may, of course, have more storage sidings, in which case you can increase the number of trains arriving at the terminus, if the platform and siding accommodation is

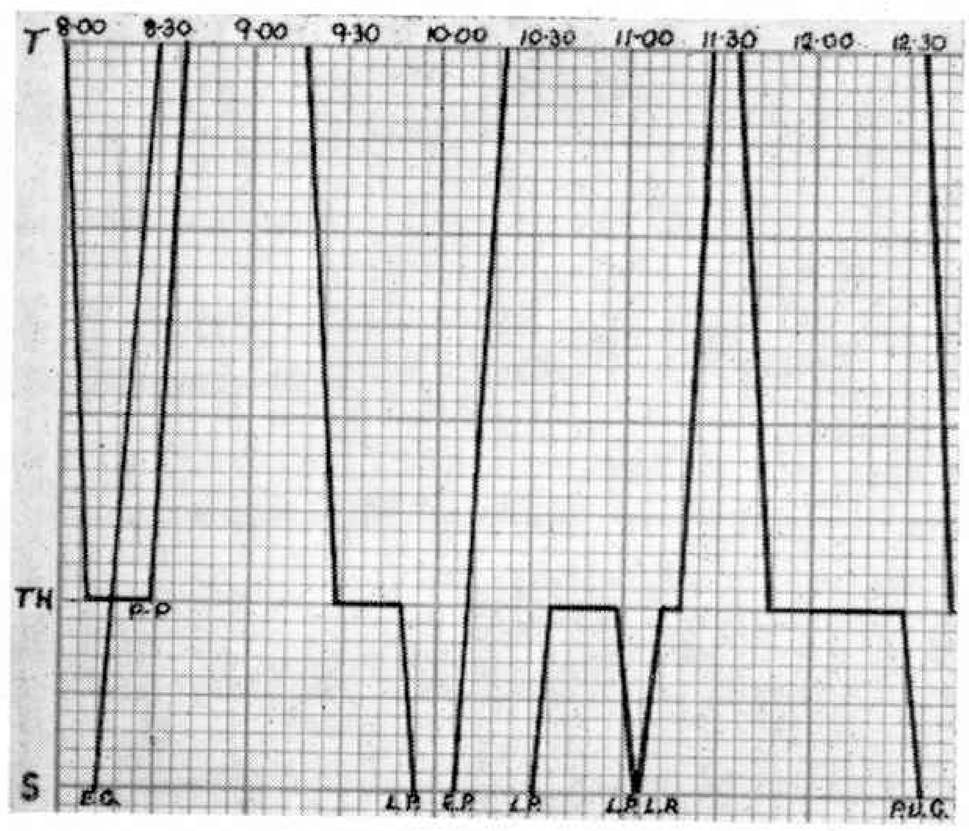


Fig. 1 Part of the graph showing several of the train services. As the article explains, it is possible to draw up the movements sheet from information given on this graph

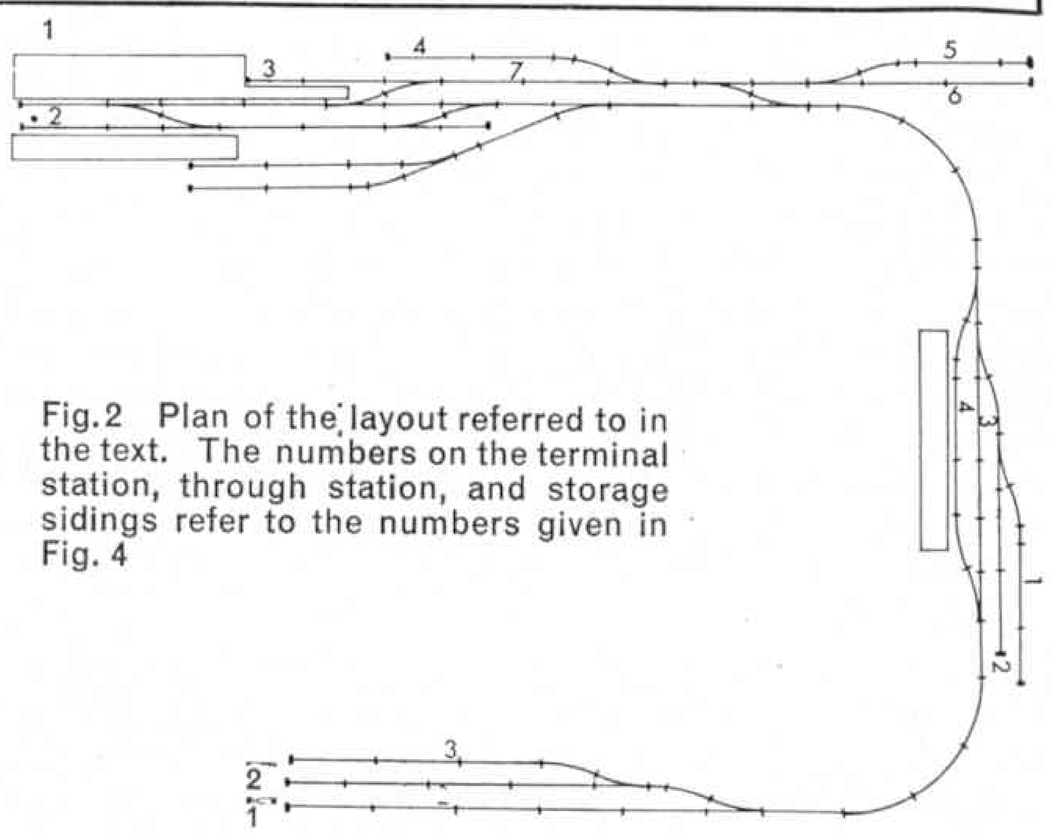


Fig. 2 Plan of the layout referred to in the text. The numbers on the terminal station, through station, and storage sidings refer to the numbers given in Fig. 4

also enlarged. Sufficient time should also be allowed for shunting operations in the goods yard.

I may appear to be stating the obvious, but do remember that the successful operation of a timetable hinges on one factor—time. Because the distances between stations on a model railway are not in proportion to full-size practice, the time taken for a train to travel between stations will also be much less, and this must be compensated for your

Time	*Train*	*Locomotive*	*Movement*
8.00	Push-pull train to through station	(P1)	Terminus 3, to through station 4
8.12	Express goods to terminus	(G1)	Storage sidings 1 to terminus 1. Shunt to 5
8.29	Push-pull to terminus	(P1)	Through station 4 to terminus 3
9.18	Local passenger to storage sidings	(P2)	Terminus 2 to siding 1
10.06	Express passenger to terminus	(P3)	Storage sidings 2 to terminus 2
10.30	Local passenger to through station	(P2)	Storage sidings 1 to through 4
10.57	Local passenger to sidings	(P2)	Through station 4 to sidings 1
11.06	Local passenger to terminus	(P2)	Sidings 1 to terminus 1
11.36	Pick-up goods to through station	(G1)	Terminus 5 to 7, to through station 4
12.30	Pick-up goods to sidings	(G1)	Through station 3 to sidings 2
12.36	Push-pull to through station	(P1)	Terminus 3 to through station 4
1.06	Push-pull to terminus	(P1)	Through station 4 to terminus 3
1.42	Express passenger to storage sidings	(P3)	Terminus 2 to sidings 1

Fig. 3 Part of a train movements and engine link list.

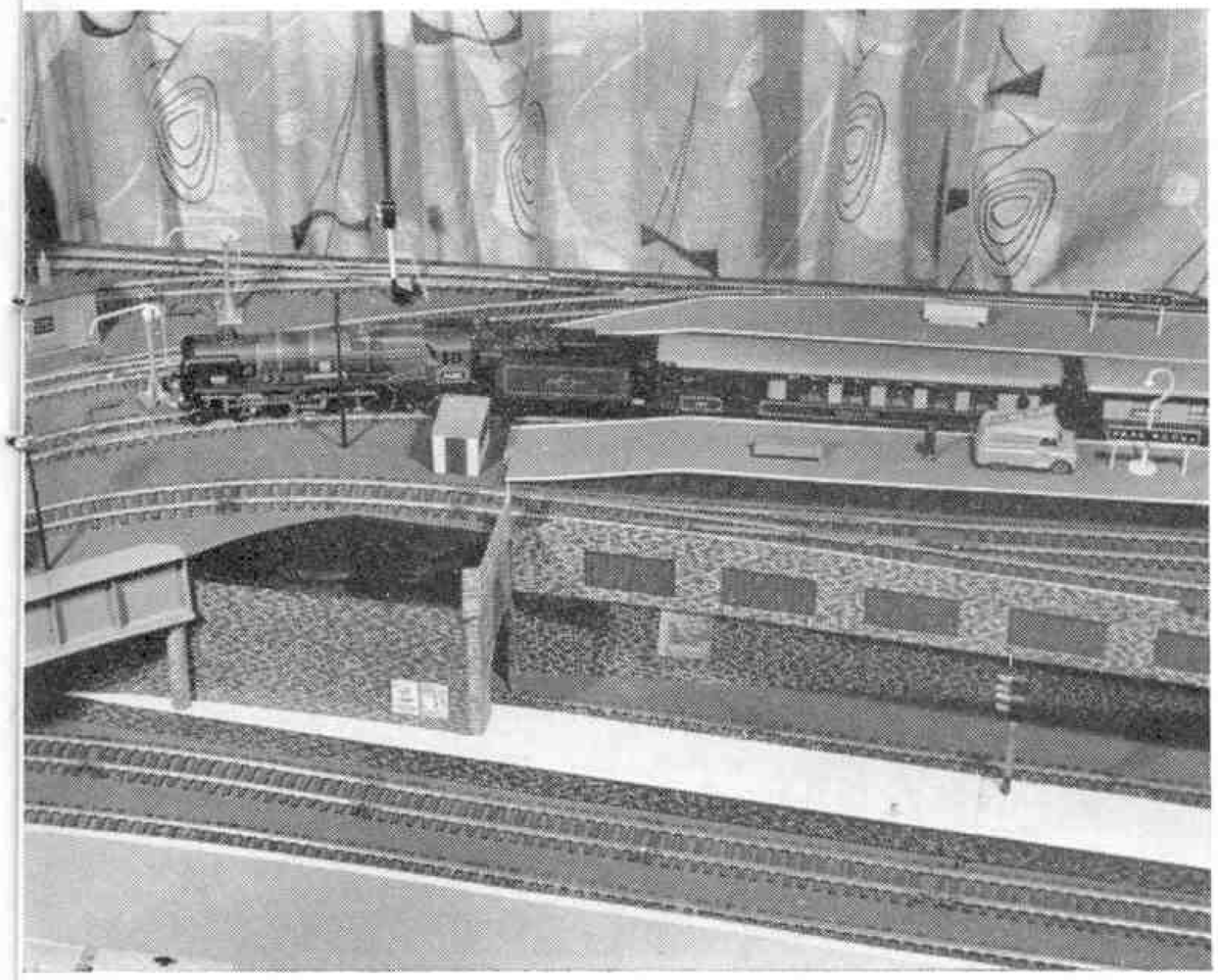
timetable. One method of doing this is to change the gear ratios of an old clock sited near the layout, to give a proportion of 3 or 4:1. A better system, in my opinion, is to plot trains in the normal way, using their scheduled times, and then to use the actual time taken for the model to travel from one station to another. You will thus have two columns on the final working timetable, and you will see in Fig. 4 that both the actual time and the scheduled time are entered in the timetable.

To make the scheduled times look realistic, the stations should be shown in the graph as being a suitable distance apart. You will see from the graph that the through station is three miles from the terminal station, and the storage sidings are placed at one-mile distance from the through station. Trains should be in exactly the same positions at the beginning and end of the timetable, so that another operating session can begin without the need to position items of rolling stock and locomotives.

When the graph is complete, a 'train movements and engine link list', similar to the one I have compiled in Fig. 3, should be drawn up. This is done by reading through each train-working on the graph and plotting it on the 'train movements and engine link list', listing the train positions on each siding and platform road. To assist with the latter job I would suggest you compile a list similar to that shown in Fig. 5. This will help to prevent any two trains occupying the same siding or platform road at the same time. The times of trains arriving and departing at any particular point should be marked down.

Finally, the working timetable for each station can be drawn up. I have shown in Fig. 4 part of the working timetable for the terminus of the layout shown in Fig. 2, and you will see that this includes all train and shunting movements in and out of the station. A normal timetable may then be compiled, but as this is of no material use for operating the layout, I have not included it in my diagrams. It can be useful, however, when visitors are viewing the layout, and those of you who wish to include it will find it is quite simple to compile using the times indicated on the working timetables for the various stations.

The West Country afternoon express leaves the main terminus on Mr. Parker's layout. It is headed by a Hornby-Dublo 'Barnstaple' loco and has a train made up of Pullman Coaches



Let us then follow the early morning train movements for the terminus. At 8 a.m. (actual time 0 min.) a push-pull train from platform 3 is despatched to the through station, carrying workmen to their places of employment. The points and signals will then be set to receive at 8.30 (actual time 5 min.), the express goods on platform 1. The goods locomotive will then push the train into siding 5 at the right hand end of the station to allow the platform to be used for another train. At 8.37 (actual time 7½ min.) the push-pull returns from the through station into platform 3. At 8.40 (actual time 8 min.) the goods locomotive sorts and marshalls the train that will eventually become the 11.36 pick-up goods. When completely marshalled, the train is shunted into siding 4, where it will wait until its turn of duty arrives.

From this example of a working timetable for an end-to-end layout you will see how interest in model railway working can be heightened.

Working Timetable for Terminus

Actual time	*Scheduled*	*Locomotive*	*Movement*
0 min.	8.00	P1	Despatch push-pull from platform 3 to through stn.
5 ,,	8.30	G1	Receive express goods on plat. 1
6 ,,	8.35	G1	Shunt goods into the siding 5
7½ ,,	8.37	P1	Receive push-pull from through stn. into plat. 3
8 ,,	8.40	G1	Marshall pick-up goods into siding 4
12 ,,	9.18	P2	Despatch local passenger from plat. 2 to storage sidings
16 ,,	10.16	P3	Receive express passenger into plat. 2
26 ,,	11.27	P2	Receive local passenger into plat. 1
28 ,,	11.36	G1	Despatch pick-up goods from siding 4 to through stn.
32 ,,	12.36	P1	Despatch push-pull from plat. 3 to through stn.
35 ,,	1.15	P1	Receive push-pull into plat. 3 from through stn.
35½ ,,	1.42	P3	Despatch express passenger from plat. 2 to storage sidings
37 ,,	2.43	G1	Receive parcels into siding 4
38 ,,	2.50	G1	Shunt and sort parcels train in sidings 5 and 6
42 ,,	3.10	G1	Shunt train into siding 7
44 ,,	3.24	G1	Despatch express goods from siding 7 to storage sidings
46 ,,	3.36	P2	Despatch local passenger from plat. 1 to storage siding
48 ,,	4.30	P1	Despatch push-pull to through stn.
50 ,,	5.03	P1	Receive push-pull plat. 3 from through stn.

Fig. 4 The final working timetable for the terminus station. Similar working tables can be drawn up for the through station and storage sidings.

Terminus Occupation List

1	2	3	4	5	6	7
8.12*	9.18*	8.00*		8.12*	2.06*	11.36*
11.06*	10.06*	8.29*		11.36*	6.30*	2.06*
3.36*	1.42*	12.36*		2.06*		3.24*
5.30	5.00	1.06*		6.30*		6.30*
		4.30*				8.00*
		5.48*				
		6.18				

Fig. 5 The terminus occupation list. The numbers at the top of each column refer to the various sidings and platforms in the terminus. The figures listed below each number indicate times at which the trains arrive and depart. Once a siding or platform has been vacated, the time at which the train arrived and left can be struck out, or marked with an asterisk as shown.



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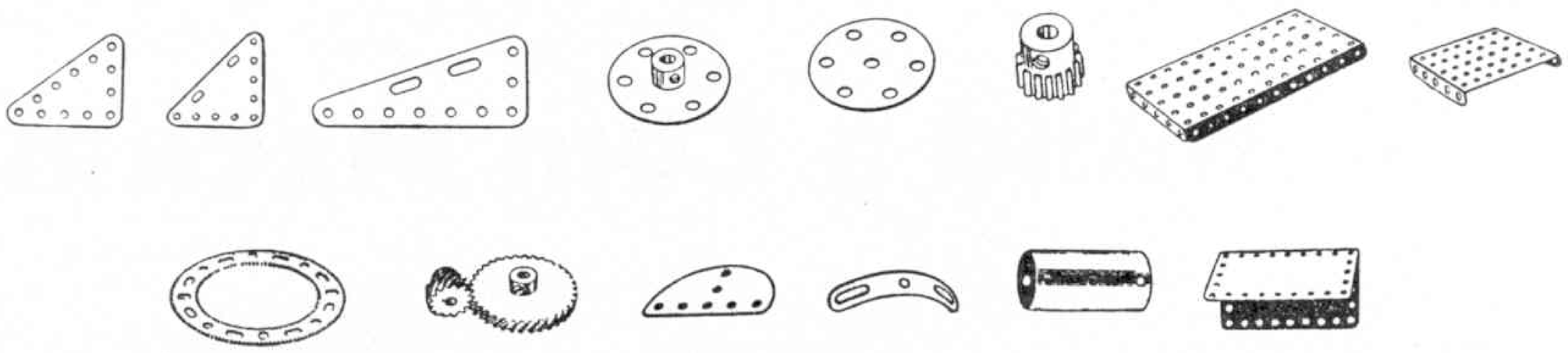
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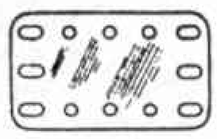
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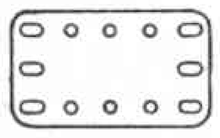
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by **Spanner**

Build a Coin Machine

AT the flick of a switch, the model described here will whirl into action and supply builders with a little pile of money! Before you get excited, however, I should explain that it isn't some sort of magic box—it is simply a coin-giving machine which must, first, be loaded with a stock of pennies before it can deliver the 'goods'. Either threepennyworth or sixpennyworth is supplied, depending on the position of a wheel on the top of the model.

Framework

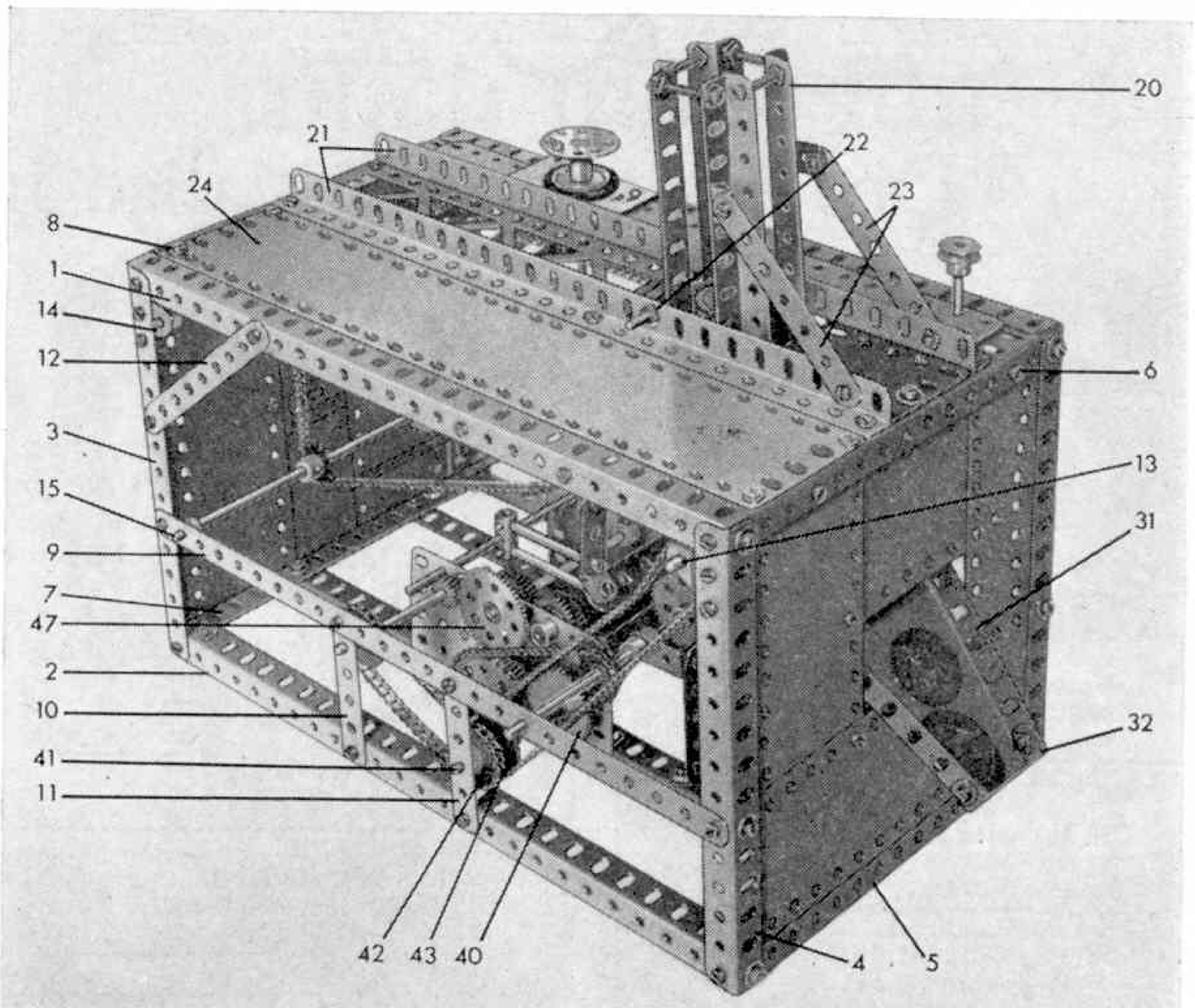
Two rectangles, each built up from two 12½ in. and two 7½ in. Angle Girders 1, 2, 3 and 4, are connected together by four 7½ in. Angle Girders 5, 6, 7 and 8. A 12½ in. Strip 9 is bolted to the upright Angle Girders and is supported by two 3 in. Strips 10 and 11. To hold the framework rigid, a 4½ in. Strip 12 is secured to Angle Girders 1 and 3. Three 8 in. Rods 13, 14 and 15, each carrying two ¾ in. Sprocket Wheels, are journalled in 1 in. Corner Brackets bolted to the Angle Girders, as shown. A 1 in. Sprocket Wheel 16 is also secured on Rod 13. Three-inch Strips are attached by paper clips in every fourteenth link of two Sprocket Chains, 168 links in length.

The Chain is then placed over the ¾ in. Sprocket Wheels on Rods 13, 14 and 15. Two 7½ in. Strips 17 and 18 are attached to the top 12½ in. Angle Girders with ½ in. Corner Angle Brackets. A 2½ in.×1½ in. Flanged Plate 19 is bolted to the Strips 17 and 18 three and a half inches from Angle Girder 1. The 3 in. Strips on the Chain must just clear the surface of this Plate.

Coin Magazine

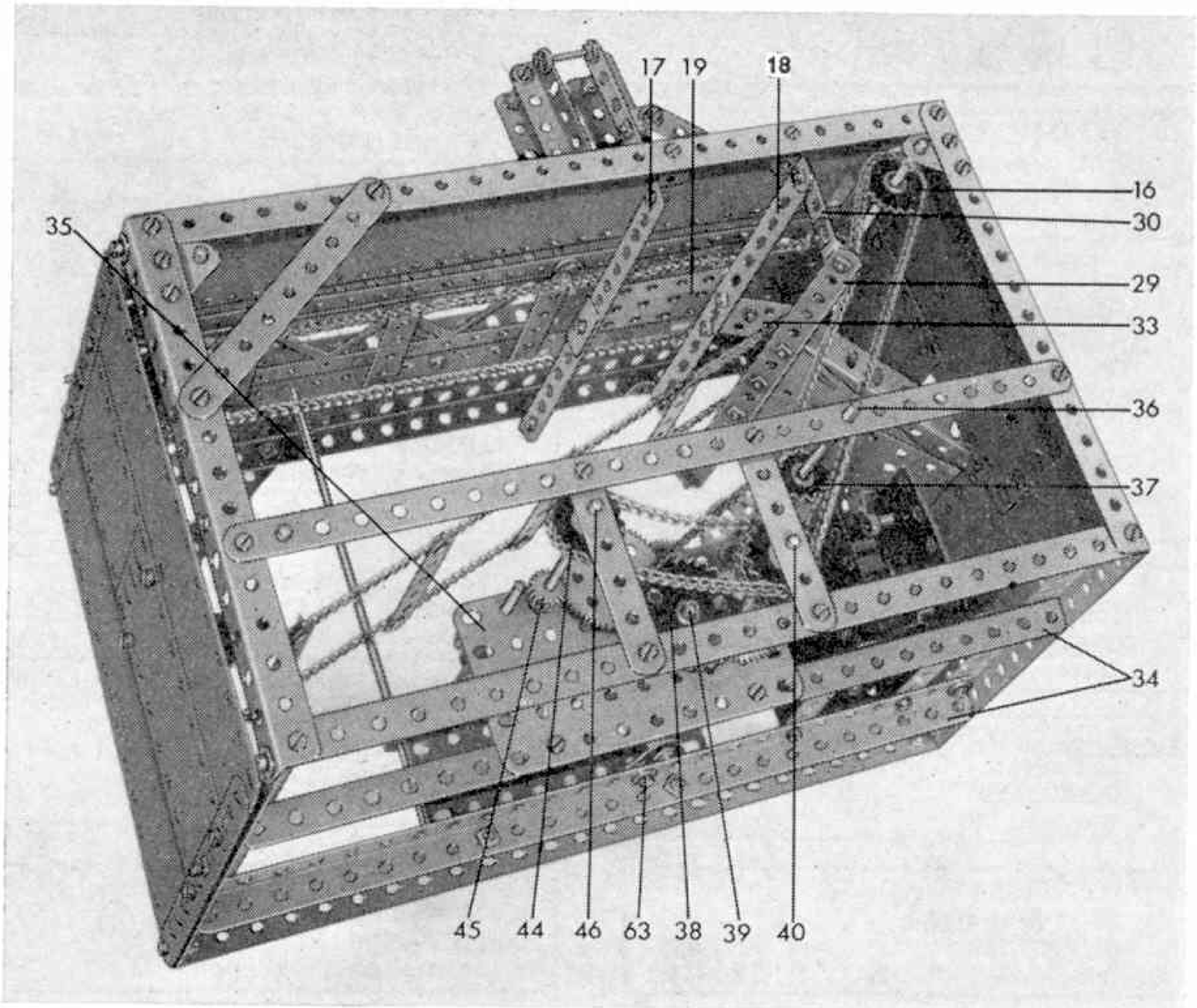
Four 4½ in. Angle Girders 20 are bolted together in pairs, using 1⅛ in. Bolts with three Nuts. The Nuts are adjusted so that a penny just clears the angle of the Girders. Two 12½ in. Angle Girders 21 are fixed to the Angle Girders 6 and 8 as shown, and the coin magazine is fastened to these by means of a 3 in. Screwed Rod 22 and two 3½ in. Strips 23, Angle Brackets being used at the magazine end.

The distance between the bottom of



This general view of the coin-giving machine clearly shows the coin magazine which the operator loads with pennies. These are delivered on request either three or six at a time.

This view of the machine shows the various sections of chain drive used in its construction



the $4\frac{1}{2}$ in. Angle Girders and the $2\frac{1}{2}$ in. $\times 1\frac{1}{2}$ in. Flanged Plates should equal the thickness of a new penny. The top is covered by a $12\frac{1}{2}$ in. $\times 2\frac{1}{2}$ in. Strip Plate 24, two $5\frac{1}{2}$ in. $\times 1\frac{1}{2}$ in. Flexible Plates 25, a $1\frac{1}{2}$ in. $\times 1\frac{1}{2}$ in. Flat Plate 26, a $7\frac{1}{2}$ in. Braced Girder 27 and two $2\frac{1}{2}$ in. $\times 1\frac{1}{2}$ in. Flexible Plates 28, overlapped two holes.

Coin Tray

A $7\frac{1}{2}$ in. Strip 29 is attached to the $7\frac{1}{2}$ in. Strip 18 by means of a $1\frac{1}{2}$ in. Strip 30 and an Obtuse Angle Bracket at each end. Two $5\frac{1}{2}$ in. Angle Girders 31 are connected to each other by a $1\frac{1}{2}$ in. $\times \frac{1}{2}$ in. Double Angle Strip 32, and the bottom of the tray is filled in by a $5\frac{1}{2}$ in. $\times 1\frac{1}{2}$ in. Flexible Plate and two $3\frac{1}{2}$ in. $\times 1\frac{1}{2}$ in. Flexible Triangular Plates, the last-named being bolted to the $7\frac{1}{2}$ in. Strip 29. Flexible Plates of various sizes enclose the space around the tray, as shown. A $1\frac{1}{2}$ in. Flat Girder 33 is attached by Angle Brackets to the front of the Flanged Plate 19 to guide the coins on to the tray.

Motor Drive and Gear Box

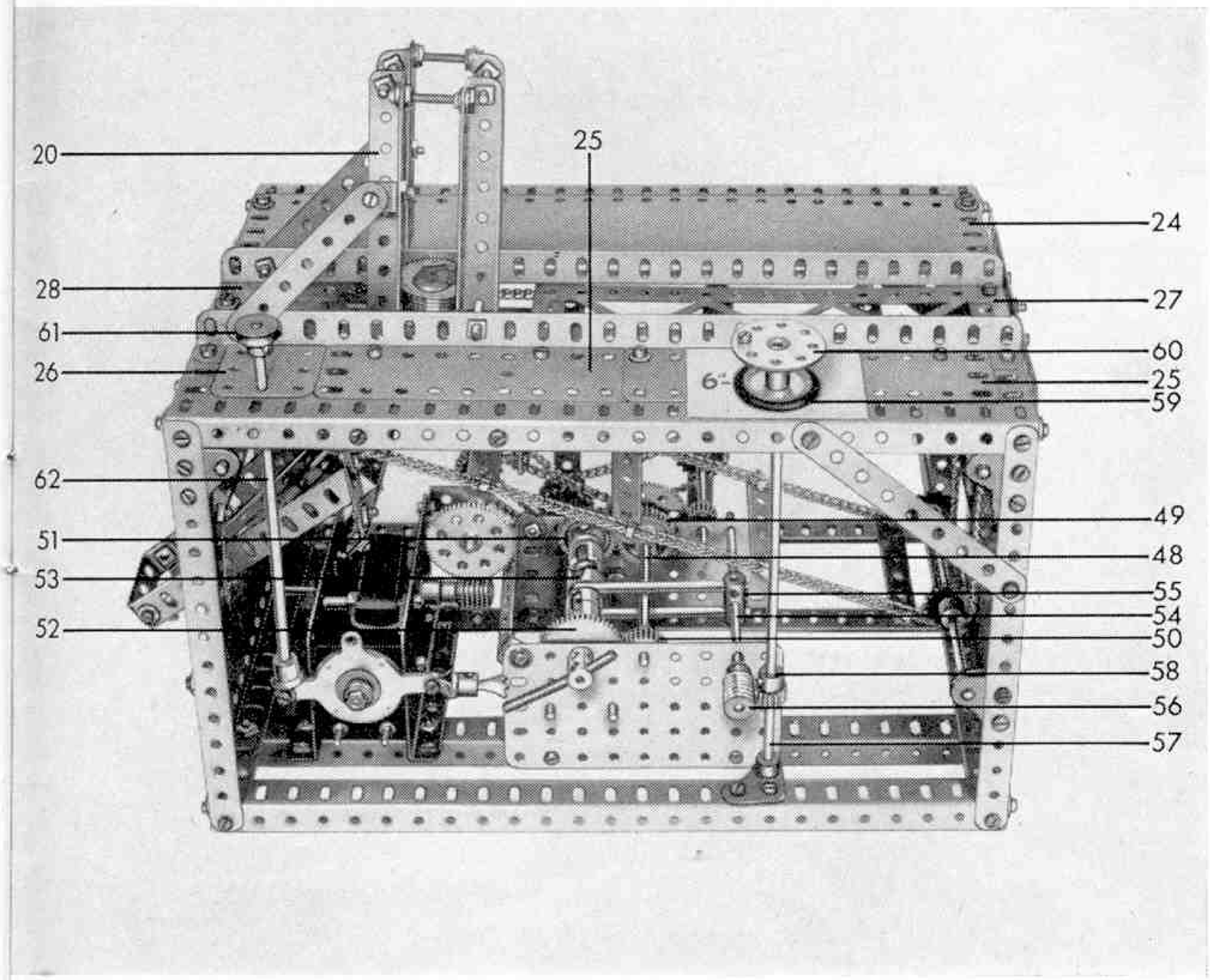
Two $12\frac{1}{2}$ in. Angle Girders 34, each carrying a $4\frac{1}{2}$ in. $\times 2\frac{1}{2}$ in. Flat Plate 35, are bolted to the Angle Girders 5 and 7. These serve as a base for the Motor. A Worm Wheel on the armature shaft of the Motor drives a 57-tooth Gear Wheel on a $4\frac{1}{2}$ in. Rod 36 that carries a $\frac{3}{4}$ in. Sprocket Wheel 37. This Sprocket Wheel is connected by Chain to a $1\frac{1}{2}$ in. Sprocket Wheel 38 which is secured to a 5 in. Rod 39 mounted in Flat Plates 35. Behind Sprocket Wheel 38 a $\frac{3}{4}$ in. Pinion engages with a 50-tooth Gear Wheel 40, mounted on an 8 in. Rod 41, which also carries two 1 in. Sprocket Wheels 42 and 43. Sprocket Wheel 43 drives Sprocket Wheel 16. A 1 in. Sprocket Wheel 44 and a $\frac{1}{2}$ in. Pinion 45 is fixed on a $3\frac{1}{2}$ in. Rod 46. Sprocket Wheels 42 and 44 are now connected by Chain. A 57-tooth Gear Wheel 47 on a 4 in. Rod 48 engages with the Pinion 45. Also secured to Rod 48 is a 1 in. Gear Wheel 49 and a $\frac{3}{4}$ in. Pinion 50.

A Socket Coupling carrying the female part of a Dog Clutch is attached to the boss of another 1 in. Gear Wheel 51, then a similar arrangement, using a 50-tooth Gear Wheel 52 in place of the 1 in. Gear, is built up. Both are mounted loosely on a 4 in. Rod with keyway, making sure that they are free to turn. Between the Socket Couplings is placed another Socket Coupling 53 carrying two male parts of a Dog Clutch, one of the Dog Clutches being fitted with a Key Bolt. The Dog Clutches are so placed that when the Motor start lever has been knocked off (as explained later) the Socket Coupling 53 can be moved to engage with either of the other two Socket Couplings. On a 5 in. Rod 54 is mounted a Coupling 55 supporting two 3 in. Rods which engage with Socket Coupling 53, and a worm 56. On an 8 in. Rod 57, mounted as shown, a $\frac{1}{2}$ in. Pinion 58 that engages with the Worm, is fixed, while a 1 in. Pulley with Rubber Ring 59 acts as a brake when the Rod is turned by means of an eight-hole Bush Wheel 60, to give the particular amount of change required.

The Motor is started by depressing the $\frac{1}{2}$ in. Pulley 61 on a $6\frac{1}{2}$ in. Rod 62 which is connected to the starting lever by an End Bearing, lock-nutted in position. Rigidly fixed to the other arm of the starting lever is another End Bearing supporting a Centre Fork. On the end of the Rod with keyway is placed a Short Coupling in which a Flexible Coupling Unit is mounted. When the Motor is started, this Flexible Coupling Unit revolves until it hits the Centre Fork, thus switching off the Motor.

By adjusting the length of the Flexible Coupling Unit and the angle of slope of the Centre Fork, the Motor can be made to stop when one of the 3 in. Strips on the endless chain is under the $4\frac{1}{2}$ in. Angle Girders 20.

The Socket Coupling arrangements 51 and 52 are held in position by placing 1 in. Rods in Rod Sockets secured to Fishplates fixed to the Angle Girders 34 by Bolts 63. The ends of the 1 in. Rods fit into the centre grooves of the Socket Couplings.



Parts required :—1 of No. 1; 3 of No. 1b; 2 of No. 2; 2 of No. 2a; 4 of No. 3; 15 of No. 4; 2 of No. 6a; 2 of No. 10; 2 of No. 12; 1 of No. 12a; 4 of No. 12c; 4 of No. 13a; 2 of No. 14; 2 of No. 15; 1 of No. 15a; 1 of No. 15b; 1 of No. 16; 2 of No. 16a; 2 of No. 18b; 1 of No. 22; 1 of No. 23a; 1 of No. 24; 2 of No. 25; 2 of No. 26; 2 of No. 27; 2 of No. 27a; 2 of No. 31; 2 of No. 32; 151 of No. 37a; 120 of No. 37b; 54 of No. 38; 1 of No. 48; 1 of No. 48b; 1 of No. 51; 2 of No. 53a; 13 of No. 59; 1 of No. 63; 1 of No. 63d; 1 of No. 65; 1 of No. 74; 1 of No. 80c; 2 of No. 94; 1 of No. 95a; 4 of No. 96; 7 of No. 96a; 1 of No. 99b; 1 of No. 103h; 4 of No. 111c; 8 of No. 111d; 2 of No. 133a; 2 of No. 144; 2 of No. 154a; 2 of No. 154b; 2 of No. 166; 3 of No. 171; 1 of No. 175; 2 of No. 179; 2 of No. 188; 4 of No. 189; 1 of No. 190a; 2 of No. 191; 1 of No. 192; 3 of No. 195; 1 of No. 197; 2 of No. 224; 1 of No. 230; 1 of No. 231; 1 E15R Electric Motor; 24 Paper Clips.

The particular amount required from the machine is decided by the selector wheel, shown in this view at figure 60. The 6d position is on the left of the white card surrounding the wheel. The 3d position is hidden by the wheel itself

by **Spanner**

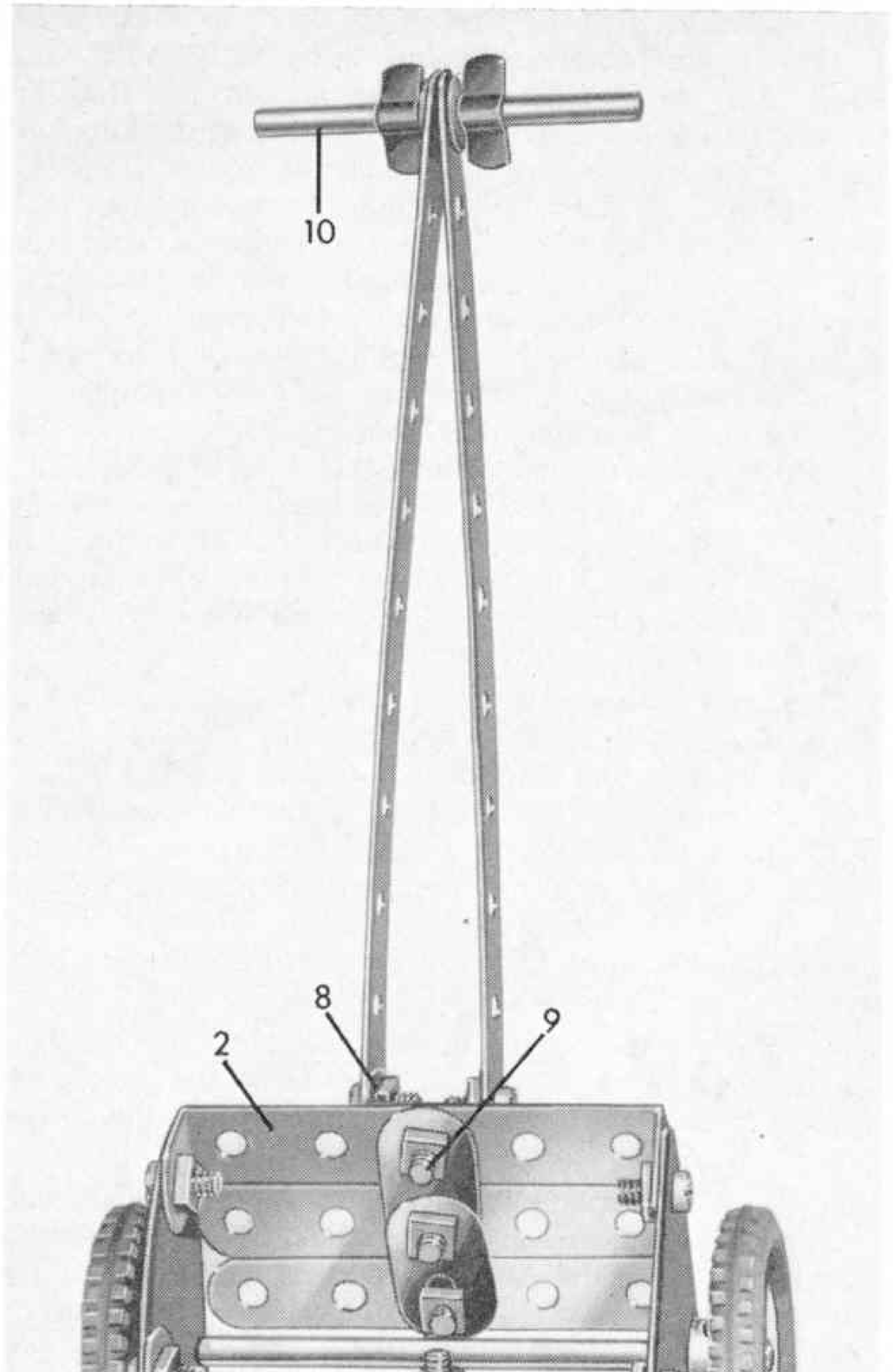
Two Models for Juniors

SHOWN here are building instructions for two small models, designed especially for younger constructors. The first is based on a Seed Distributor, which is really a funnel—or hopper—on wheels. In real-life, seed is placed in the hopper and, when the machine is pulled along, the seed runs out of the hopper and is spread evenly over the ground.

The second model demonstrates the action of a Centrifugal Governor, for regulating the speed of a motor or engine. When the Crank Handle is turned, the governor shaft revolves and centrifugal force pushes the hanging arms outwards. The faster it revolves the farther out the arms are pushed. On an actual machine, the arms would be coupled to a motor regulator so that, at a certain speed, the movement of the governor arms would actuate a regulator which, in turn, would prevent the speed of the motor increasing.

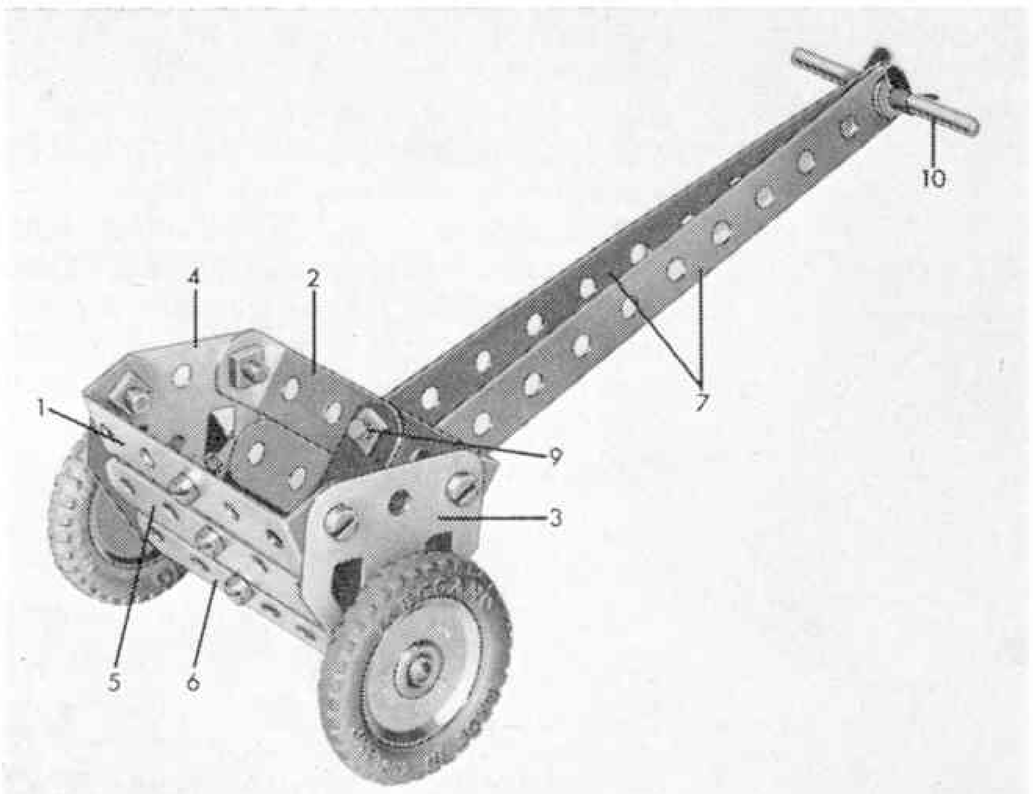
Seed Distributor

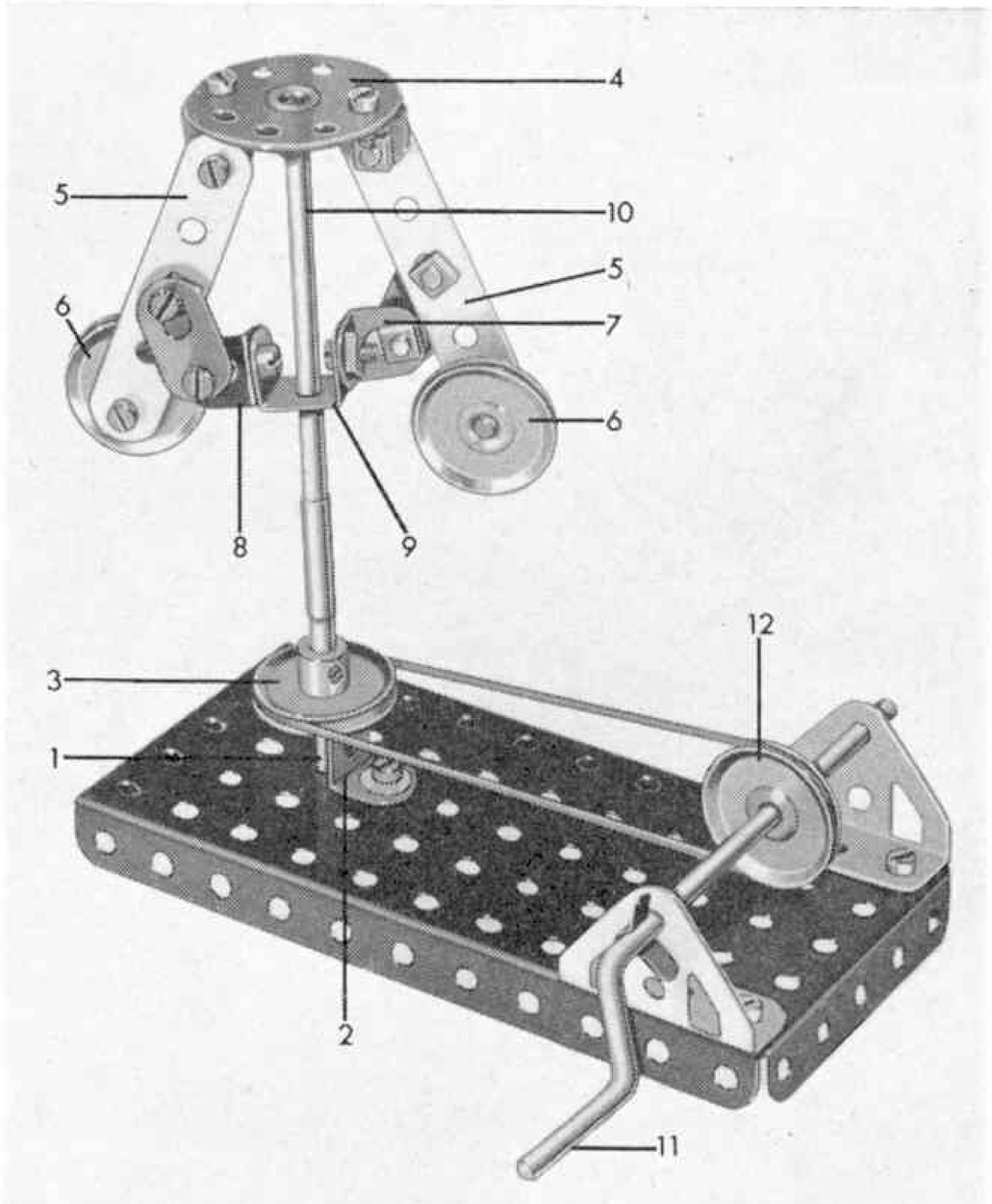
Two $2\frac{1}{2}$ in. by $\frac{1}{2}$ in. Double Angle Strips 1 and 2 are bolted between two Flat Trunnions 3 and 4, in the position shown. Attached to each Double Angle Strip by two Fishplates,



The front view of the Seed Distributor illustrating how the hopper is constructed from two Double Angle Strips, ordinary Strips and Flat Trunnions

The completed Seed Distributor in Meccano is either pushed or pulled along as would be the real-life machine





A model Centrifugal Governor is simple to construct and shows in principle how an actual governor operates

are two 2½ in. Strips 5 and 6, the lower Strip being spaced from the lower Fishplate by a Washer. A 3½ in. Rod is journalled in the apex holes of the Flat Trunnions and is held in place by two 1 in. fixed Pulleys with Tyres.

A 5½ in. Strip 7 is bolted to each lug of a Double Bracket 8 which, in turn, is fixed to Double Angle Strip 2 by Bolt 9. At their other ends the Strips are held together by two Spring Clips on a 2 in. Rod 10, Washers being used as spacers between the Clips and the Strips.

Centrifugal Governor

It must be stressed that this model is meant only to illustrate the action of a governor and, as it stands, cannot be incorporated into a larger working model. A bearing for a 2 in. Rod 1 is obtained by bolting a ½ in. by ½ in. Reversed Angle Bracket 2 to a 5½ in. by 2½ in. Flanged Plate, as shown. The Rod is held in place by a Spring Clip beneath the Plate and a 1 in. Fixed Pulley 3 above the Reversed Angle Bracket.

Two Angle Brackets are bolted, diametrically opposite each other, to a Bush Wheel 4. A 2½ in. Strip 5 is lock-nutted to the other lug of both these Angle Brackets, care being taken to see that the Strips, themselves, are free to move and a 1 in. Pulley with boss 6, is fixed to the opposite end of each Strip by a ⅜ in. Bolt held in the Pulley by a Grub Screw. Two Angle Brackets 7 and 8, are bolted tightly to the lugs of a Double Bracket 9. To the free lugs of these Angle Brackets, Fishplates are lock-nutted, their other ends being lock-nutted through the Centre Holes of Strips 5. This whole assembly is then fixed on a 3½ in. Rod 10, which is connected to Rod 1 by a Rod Connector.

A 3½ in. Crank Handle 11, carrying a 1 in. fixed Pulley 12, is mounted in two Trunnions bolted to the baseplate, Spring Clips being used to hold the Crank Handle in position. The model is completed by connecting Pulleys 3 and 12 with a 2½ in. Driving Band.

Parts required.—2 of No. 5; 2 of No. 10; 1 of No. 11; 4 of No. 12; 1 of No. 16; 1 of No. 17; 1 of No. 19s; 4 of No. 22; 1 of No. 24; 3 of No. 35; 21 of No. 37a; 15 of No. 37b; 1 of No. 38; 1 of No. 52; 2 of 111c; 1 of No. 125;; 2 of No. 126; 1 of No. 186; 1 of No. 213.

Meccano Model-Building Competition

READERS in Great Britain are reminded that the closing date for the current Model-building Competition is the 31st of this month. In view of the state of International mails over the Christmas period, however, it has been decided to allow Overseas competitors an extra two weeks in which to submit their entries. The closing date for entries from outside the U.K., therefore, has been extended to February 14, 1965, but any we receive after that date will be automatically disqualified.

As explained in the November "M.M.", the contest is open to owners of Meccano Outfits living anywhere in the world. No restrictions are attached either to the number of parts which can be used, or to the type and number of models which can be built, except, of course, that models copied from Instruction Manuals will not be acceptable. Owning a small Outfit need not be a disadvantage. The judges will always choose a strong, well-constructed model using only a few parts above a large, rickety structure, using a large number of parts. It must also be remembered that originality counts.

Cash Prizes

Entries will be divided into two sections—A for competitors under 14 years of age on the closing date and B, for competitors aged 14 or over on that date. Each section will be awarded a separate set of prizes, as follows: Section A, 1st £5 5s. 0d.; 2nd £3 3s. 0d.; 3rd £2 2s. 0d.; ten prizes each of 10s. 6d. Section B, 1st £7 7s. 0d.; 2nd £5 5s. 0d.; 3rd, £3 3s. 0d.; ten prizes each of £1 1s. 0d.

How to Enter

Having built your model, obtain one or more clear pictures of it or, failing this, a reasonably-detailed sketch. If you are not artistically minded, it is quite permissible to have a friend sketch it for you, but the model itself must be your own unaided work. It is also advisable to prepare a short description of the model, mentioning any points of interest you would like brought to the attention of the judges, but under no circumstances must the model itself be sent.

Write your name and address on the back of each photograph or drawing, together with the letter A or B, according to your age group, and forward to : "Winter Model-building Contest", Meccano Ltd., Binns Road, Liverpool 13. The competition is held only on the understanding that Meccano Ltd. is not responsible for any entry lost or damaged, that the judges' decisions are final and that prize-winning entries can be used by Meccano Ltd. in any way they wish. Unsuccessful entries will be returned if accompanied by a suitably stamped addressed envelope.

All the answers to puzzles on page 19

Tricky Teasers

Each man paid 9s. Deduct the 2s. which the waiter kept. 27s. less 2s. makes 25s.—which was the correct amount. (Most people get confused by keeping the incorrect amount (30s.) uppermost in their minds!)

2. Peal, plea, leap, pale.
3. The Prime Minister's name was the same during the war as it is now!
5. How do eight eights make a thousand?

888
88
8
8
8
1,000

Quick Quiz

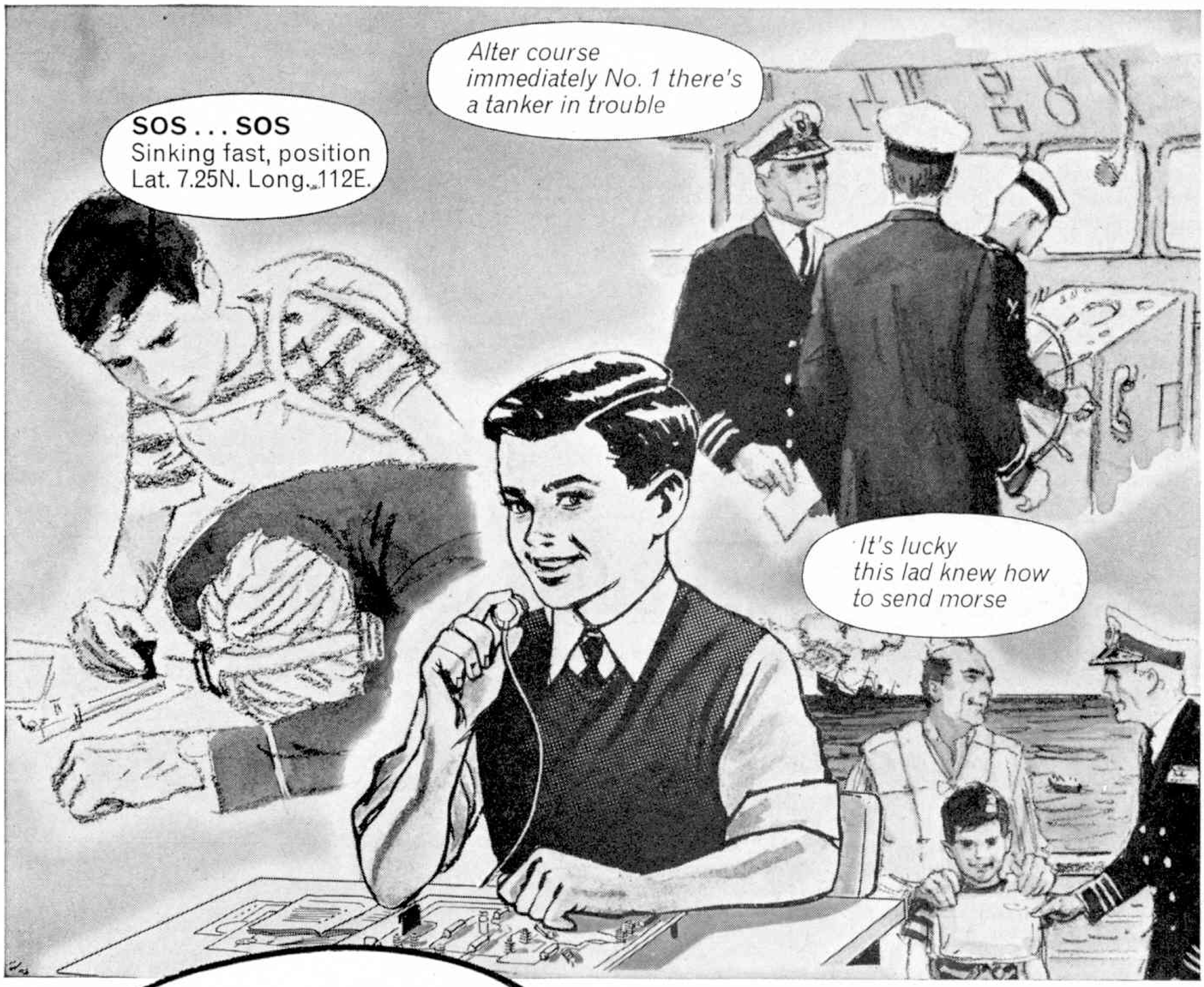
1. A Trident airliner
2. 4 ft 8½ in.
3. True. The Climbing Perch of India
4. Stalactite
5. The wingless bird, the Kiwi. National emblem of New Zealand
6. A mosque, where the Muslim faith is practised

Score: Over 35 excellent
Over 30 V. good
Over 20 Fair

Car Quiz No. 4

Ford Anglia

S	U	N	B	U	R	N	■	A	S	S	I	S	T
A	■	I	■	T	O	O	■	R	A	■	T	O	R
D	I	L	A	T	E	■	P	E	N	■	E	M	U
D	■	E	V	E	■	R	E	A	D	■	M	E	A
L	■	■	O	R	B	I	T	■	■	S	■	■	N
E	A	R	N	■	■	P	A	L	I	N	G	■	T
S	■	■	■	P	E	E	L	■	■	A	R	C	■
■	S	T	O	O	L	■	S	■	G	R	O	A	N
H	O	A	X	■	M	■	■	D	R	E	A	M	Y
E	N	T	E	R	S	■	C	O	A	S	T	■	L
A	■	■	N	O	■	R	A	S	P	■	■	T	O
V	A	T	■	B	A	O	R	■	E	■	M	A	N
E	R	O	S	■	M	O	T	H	■	M	A	R	S
S	T	O	R	E	■	T	■	E	R	E	C	T	■



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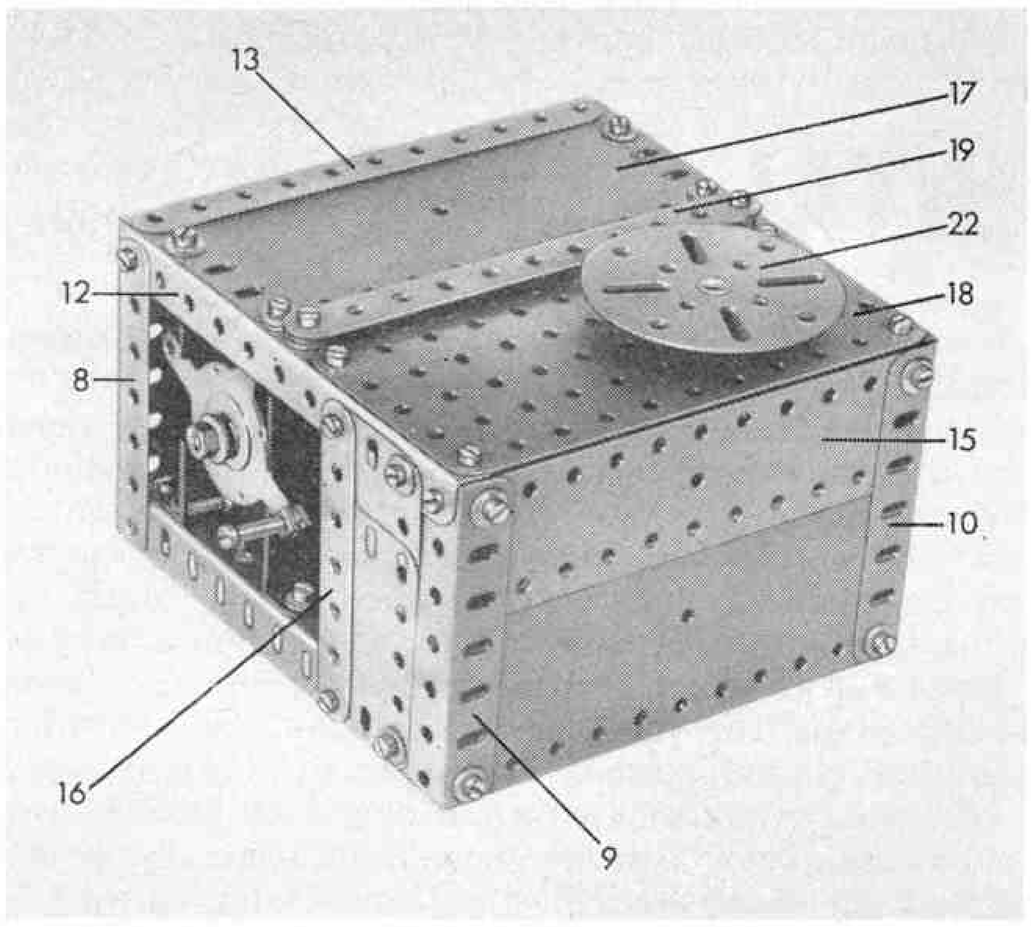
by **Spanner**

A Potter's Wheel

IN the world of modelling, as in everything else, different things appeal to different people. In these pages we try to accommodate all tastes without forcing our own particular likes on builders. There are times, however, when a model to be featured appeals especially to us, and the Potter's Wheel described here is such an example.

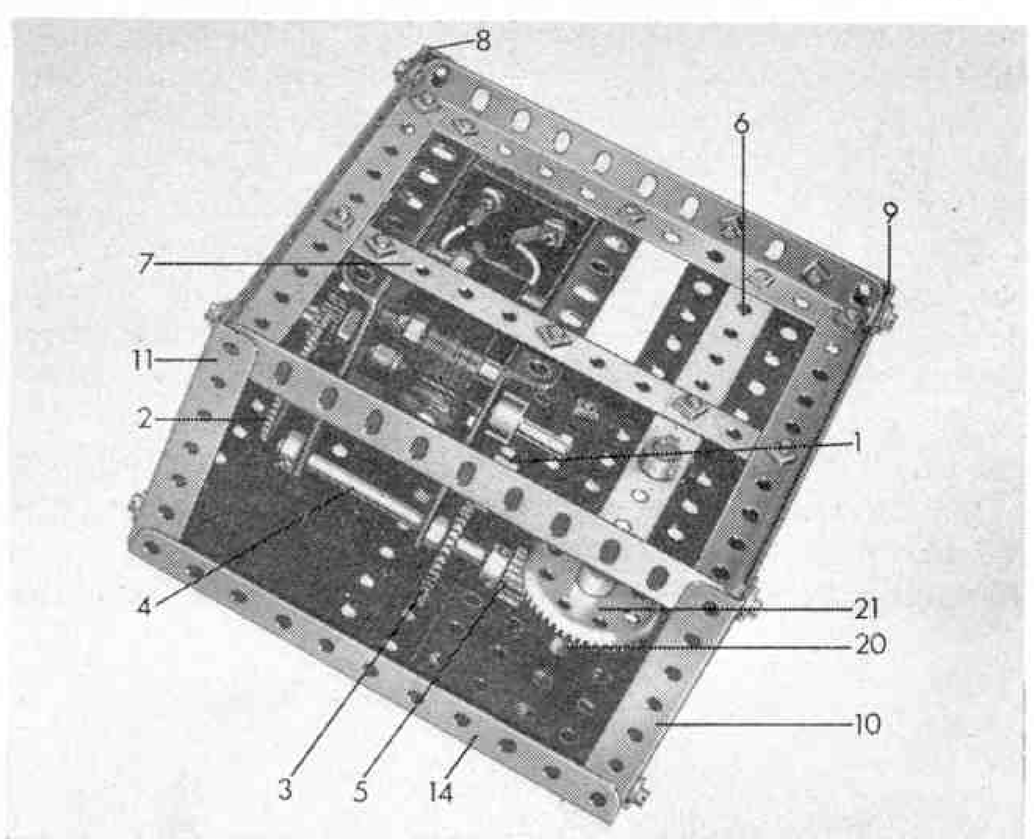
I have always been fascinated by models which, besides imitating the actions of the prototypes, can actually be used to produce results. For example, it is possible to turn candles on some Meccano lathes in the same way that wood or metal may be turned on a real lathe and form them into intriguing shapes. This Potter's Wheel, however, despite its simplicity, is even more appealing than a lathe, simply because it was designed for use with Meccano Limited's new modelling compound Play-Doh. One of the appealing features of Play-Doh is that it hardens when left in the air; therefore, anything made on our Meccano Potter's Wheel can be left to harden, cleaned up and then painted, to be used, perhaps, as an ornament.

Material other than Play-Doh can be used but, whatever the compound, I must stress that the model is far from being a perfect machine. It will not be possible to produce anything very sophisticated on it, but you can have great fun producing simple items. Here is how you build it:



The simple-to-make model of a Potter's Wheel designed for use with Meccano Limited's new modelling compound Play-Doh.

Below: A view of the model showing the Motor and gearing.



Reduction Gearing

Mounted in the side plates of an E15R Electric Motor is a 3 in. Rod held in place by a $\frac{1}{2}$ in. Pinion 1 and a 57-tooth Gear 2. Gear 2, spaced from the side plate by two Washers, is in constant mesh with a $\frac{1}{2}$ in. Pinion on the motor shaft. Pinion 1, in turn, is in constant mesh with another 57-tooth Gear 3, fixed on another 3 in. Rod 4, also mounted in the Motor side plates and held by Gear 3 and a Collar. Secured on the end of this Rod is a further $\frac{1}{2}$ in. Pinion 5.

Framework

A square is built up from four $5\frac{1}{2}$ in. Angle Girders, strengthened by two $5\frac{1}{2}$ in. Strips 6 and 7, to which the Motor is bolted. Four $3\frac{1}{2}$ in. Angle Girders 8, 9, 10 and 11, are attached to the square, one at each corner, at the same time fixing three $5\frac{1}{2}$ in.$\times 2\frac{1}{2}$ in. Flexible Plates in position between Angle Girders 9 and 10, 10 and 11, and 11 and 8. A further three $5\frac{1}{2}$ in. Angle Girders 12, 13 and 14, are bolted to the $3\frac{1}{2}$ in. Angle Girders at the top, at the same time extending the three $5\frac{1}{2}$ in.$\times 2\frac{1}{2}$ in. Flexible Plates with three $5\frac{1}{2}$ in.$\times 1\frac{1}{2}$ in. Flexible Plates 15. Two $2\frac{1}{2}$ in.$\times\frac{1}{2}$ in. Flexible Plates, overlapped three holes and edged by a $3\frac{1}{2}$ in. Strip 16, are fixed to Angle Girder 12, and the corresponding Angle Girder at the bottom of the model.

The top of the model is covered by a $5\frac{1}{2}$ in.$\times 2\frac{1}{2}$in. Flexible Plate 17 and a $5\frac{1}{2}$ in.$\times 2\frac{1}{2}$ in. Flat Plate 18, a space of one hole being left between the two, through which Gear Wheel 3 protrudes. This space is encased by a $5\frac{1}{2}$ in. Strip 19, bolted to Angle Girders 12 and 14 by $\frac{3}{8}$ in. Bolts, but spaced from them by three Washers on the shank of each bolt.

Rotating Platform

A $3\frac{1}{2}$ in. Rod 20, carrying a $1\frac{1}{2}$ in. Contrate Wheel 21, is journalled in Flat Plate 18 and $5\frac{1}{2}$ in. Strip 6, being held in place by a Face Plate 22 above Plate 18 and by a Collar beneath Strip 6. The Contrate Wheel is in constant mesh with Pinion 5.

The material to be worked is placed on the Face Plate, but you may find that it does not stay in place. If so, this can be remedied by fixing bolts through the holes in the Face Plate with their shanks pointing upwards.

Having built the model, you may prefer a larger table, in which case I suggest that you substitute a 4 in. or a 6 in. Circular Plate, attached to a Bush Wheel, for the Face Plate. The plastic 'knife' supplied with the Play-Doh Fun Factory, incidentally, makes an excellent tool for forming the 'pots'.

Parts required.—3 of No. 2; 1 of No. 3; 7 of No. 9; 4 of No. 9b; 1 of No. 16; 1 of No. 16b; 3 of No. 26; 2 of No. 27a; 1 of No. 28; 42 of No. 37a; 40 of No. 37b; 22 of No. 38; 5 of No. 59; 1 of No. 60; 1 of No. 109; 1 of No. 111; 2 of No. 111c; 2 of No. 188; 4 of No. 189; 5 of No. 192; 1 E15R Electric Motor.

Calling all Enthusiasts

Mr. Doug Rorke of 868 Shadeland Avenue, Burlington, Ontario, Canada, is at present compiling a minutely-detailed History of Meccano Parts, and would be pleased to hear from anybody who is interested in historical Meccano matters. We have been supplied with a summary of the history and can assure readers that, when completed, it will give a comprehensive picture of the Meccano system from its inception in 1901 until the present day.

Mr. Rorke is a private authority on the Meccano hobby and is keenly interested in all matters connected with it. Any reader wishing to contact him can be certain of a personal, friendly and helpful reply.



Dinky Toys No. 516, Mercedes-Benz 230SL comes complete with a removable 'hardtop' hood.

THREE IN THE CONTINENTAL STYLE by Chris Jelley

AS many people know, Meccano Limited has a subsidiary company at Bobigny, near Paris. This company produces, among many other things, its own extensive range of Dinky Toys which are not normally available in Britain. However, we have obtained stocks of three outstanding French-produced Dinky Toys which should appeal to all collectors and more especially to those enthusiasts, of whom there are a great number, who like to obtain as many varieties of Dinky Toys as they can.

Packed in the striking Dinky visi-pak, the new French Dinkies will be coming along shortly and will give collectors the chance to add a 'Continental corner' to their layouts.

In addition to these, however, Dinky Toy dealers will also shortly be carrying stocks of two colourful new releases from the Liverpool factory—the Ford G.T. racing car and, by way of contrast, the 1913 (bull-nose) Morris Oxford, a really delightful 'oldie'. These are shown in colour in this month's 'M.M.' and I hope to give you fuller details about them in my next article.

Now, back to the three newcomers from France—all first-class replicas. To start with there is that elegant sports model the Mercedes-Benz 230 SL, to be marketed under sales number 516.

Detachable 'Hardtop'

First and most important, this model comes complete with a detachable 'hardtop' hood, as the top picture on this page shows.

Other features include opening bonnet, giving access to a detailed engine, opening boot, forward tipping seat backs, all-round suspension and full interior fittings. Also included are 'glass' headlamps, similar to those on our own Mercedes-Benz 600, and a die-cast base. Finish is in metallic red with cream interior and hood.

The real-life vehicle is one which I should very much like to own myself. Power comes from a six-cylinder engine of 2,306 c.c. capacity, that develops a power-output of 170 b.h.p. All this gives the car a top speed of 125 m.p.h. and the amazingly high cruising speed of 110 m.p.h. A particularly surprising feature is the low fuel consumption —20-24 m.p.g.—in spite of the size of the engine. Transmission to the rear wheels is via a manually-operated four-speed and reverse gearbox, but automatic transmission is available as an optional extra. Riding comfort and road-holding are quoted as being magnificent, while disc brakes on the front wheels are a most important safety factor.

Sleek Beauty

Passing on now to our second release, it has often been said that the Citroen DS19 is 10 years ahead of its time, and this might well be true. Certainly, I can think of no other car in existence with such a distinctive, futuristic look as this sleek beauty and Meccano France have made an excellent job of producing it in model form. Sold under list No. 530, the Dinky version faithfully follows the lines of the prototype. Fitted with Prestomatic steering and four-wheel suspension it has, in addition, an opening bonnet, opening boot, windows, seats and steering wheel. Beneath the bonnet is a minutely-detailed engine, immediately in front of which a spare wheel is mounted. The final touch is given by jewelled headlights set into the front wings and a two-tone colour scheme of lime green with off-white roof and upholstery.

Manufactured by S.A. André Citroen of Paris, the actual

vehicle presents one or two surprises. By modern standards it is a big car—only three inches short of 16 feet—yet it is only powered by a four-cylinder engine. In spite of this, it has a maximum speed of 100 m.p.h. and can cruise over long distances at 80 m.p.h. But this is not really as astonishing as it seems when you consider that, although having only four cylinders, the engine has a capacity of 1,911 c.c. and a power output of 83 b.h.p. What is surprising, in view of the engine size, is that it has a fuel consumption ranging from 25 up to 30 m.p.g. This attractive Continental car has front wheel drive.

Two other particularly interesting features of the Citroen are the suspension — styled 'self-levelling hydraulic-pneumatic', and the front brakes, which are of the disc type. This latter feature, as regular readers of my notes will have gathered, is a particular favourite of mine because I believe discs to be far safer than ordinary drum brakes. Continental manufacturers seem to be much more advanced than we are from this viewpoint, although the position in this country is slowly changing.

The Citroen Company, as already mentioned, is based in Paris and so are the producers of the car which forms the basis of our third French model—the Panhard 24C. Under sales number 524, this is a particularly attractive replica. In addition to standard fixtures such as suspension, Prestomatic steering and interior fittings, it has opening side windows—a feature which appeals to many collectors.

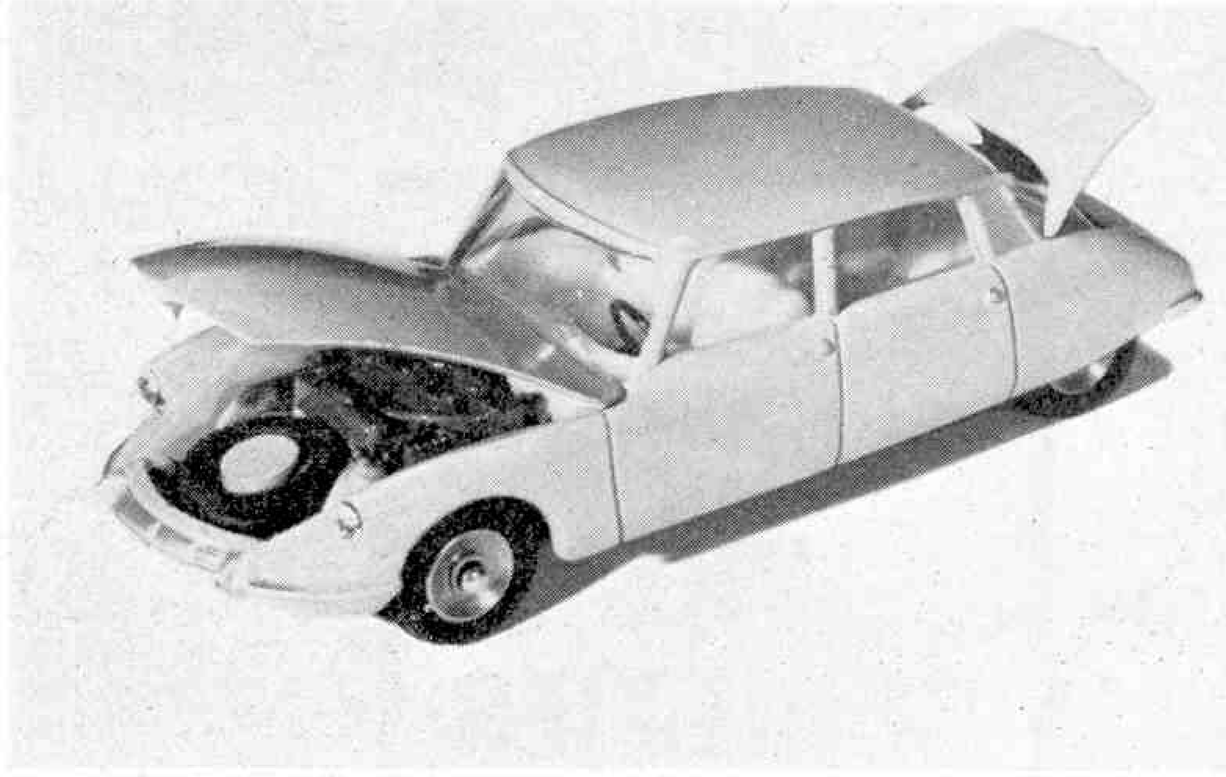
Minute Detail

An enormous amount of attention had been paid to body detail which is so minute as to embrace the titles 'Panhard' on the side and '24C' on the boot lid. 'Glass-covered' headlamp recesses are also in evidence, along with the correct amount of grille work. Body finish is dark grey, with red upholstery.

In real life, the Panhard is produced in two versions—a sports coupé and a saloon. The latter, serving as the prototype for our model, is identified by the designation 24C, whereas the number 24CT is allocated to the coupé. Power comes from a small, two-cylinder, o.h.v. engine of 843 c.c. that develops 50 b.h.p. Small as the engine may be, however, it succeeds in giving the car a top speed in excess of 90 m.p.h. and a cruising speed of 85. Average fuel consumption varies between 34 and 36 m.p.g. which, undoubtedly, could be termed economical.

Opening side windows are one of the features of the Panhard 24C (Dinky Toys No. 524). A very sleek little model.





The futuristic lines of the Citroen DS19 are well-produced in Dinky Toy No. 530. Note spare wheel in engine compartment

Twin headlamps are features of both versions, each pair being mounted in a single recess. This results in an unusual and not-unpleasant appearance, rather reminiscent of slanted Oriental eyes, that gives the car a character of its own. Both versions also have two doors but, inside, the saloon has fixed seating for four people—the coupé for only two, although two occasional seats are fitted.

As I write this, I have some official literature concerning the Panhard 24 in front of me (unfortunately, it is in French, which was never my strong-point at school!). As I understand it, the body is designed to 'aerodynamic conception'. Well, without being an aerodynamics expert, I can tell, from one glance at its sleek shape, that this is no idle boast!



American Display

Mr. David Stuart of Hollywood, California, has kindly supplied me with a photograph (reproduced above) and details of a display, incorporating Dinky Toys, that was mounted in the foyer of the Theatre Arts Building of Los Angeles City College. The function of this display and of a similar one set up at the University of California in Los Angeles by the Theatre Arts Department there, was to honour the American Broadcasting Company's contribution to higher education in America, and its 'unceasing efforts to improve the quality of television'.

The Dinky Toy's range of A.B.C. television equipment was ready-made for the job on hand, and was obtained and used accordingly to good effect, with Mr. Stuart himself playing an important part in preparing the scenes.

The accompanying picture shows only a small part of the display, which also includes two large buildings, a motorpool and a two-storey car park in addition to various outbuildings, a park, a lawn with a fountain and a second car park. In all, an extremely impressive layout.

AROUND THE SOCIETIES

S. Midlands S.M.S.

THE SOUTH MIDLANDS Senior Meccano Society is being formed for adults who have continued their interest in Meccano model engineering. Regular meetings will be held throughout the winter months, and it is hoped to demonstrate models and mechanisms, and also to give talks on the subject. Occasional exhibitions may take place, and places of engineering interest will be visited during the summer. The society will be based at Cheltenham, but any boys who can find transport to meetings will be welcome. For further details apply to the Hon. Organiser, Mr. Esmond H. L. Roden, of 25 Cleevelands Avenue, Cheltenham (telephone Cheltenham 59825).

St. Annes Y.M.C.A.

MEMBERS OF THE Lytham St. Annes Y.M.C.A., who include a large number of Meccano and Hornby-Dublo enthusiasts, are eagerly looking forward to next April when they hope to be able to move into their fine new headquarters in St. Alban's Road. The removal will be in two phases and because of this some of the club's activities, such as the Model Railway Section, will continue to operate for the time being in the existing building.

Throughout the greater part of last year the model railway was again on exhibition to the public. Thousands of holidaymakers passed through and showed their appreciation of the boys' efforts through the collecting box, the proceeds of which were devoted to the Y.M.C.A. rebuilding fund.

The Model Railway Section is open two nights a week and is attracting ever-increasing interest. Leader of the H.R.C. is Mr. John Price and the secretary is Mr. Brian Pickett.

The Meccano Section have reluctantly said goodbye to Mr. George Strangeway, their Leader, who has moved to the South of England. Mr. Strangeway helped to found the Y.M.C.A.'s Meccano Club and did a great deal of work on its behalf. He is very much missed by the boys, who wish him well in his new sphere.

East Ham & Dist M.R.C.

THE TRACK WORK and wiring on the new 30 ft. by 10 ft. 00 gauge layout will be completed during January. Only the scenery remains to be finished, and then the layout will be ready for the exhibition which the club is to hold during Whit Week. Training on the layout will start very shortly, and new members will be very welcome to participate.

The meetings are held in St. Gabriel's Church Hall, Aldersbrook Road, E.11 (101 bus to the door from all local stations) each Monday at 7.30 p.m., when the Hon. Secretary will be in attendance to answer any questions visitors may have. Prospective members can also write to the Secretary, Mr. G. R. Lloyd, of 32a Goldsmith Road, London, E.10.

Railway & Canal H.S.

TOWARDS THE END of last year members made a trip by narrow boat on the Wey Navigation, that little-known waterway linking Guildford and Godalming to the Thames. Embarking at Mill Mead Lock, Guildford, on the 'Arcturus'—a former Grand Union Canal Company's motor narrow boat—the members journeyed upstream to Shalford, to see the junction of the abandoned Wey and Arun Canal route to Portsmouth. Travelling down river from this point as far as Sutton Place, they returned to Guildford Wharf, where they inspected an early treadmill-operated wharf crane.

The Wey Navigation is one of the few waterways that maintained an independent commercial existence up to the present decade. Its future is now happily assured by the recent transfer of the undertaking, by the owner, as a gift to the National Trust. The river was originally made navigable under an Act of 1651, and was among the earliest navigations in Southern England to be canalised with pound locks. Some early, turf-sided examples remain on the river to this day.

The tour, which was attended to near capacity, was organised by the London Group of the society. Additional copies of the historical notes issued for the occasion are available, and may be obtained from the Hon. Group Secretary, Mr. J. A. Hall, of 123 Crescent Road, New Barnet, Hertfordshire.

Gindiri School

AN EXCAVATOR and a big wheel are the latest models on which members of the Meccano Section have been at work.

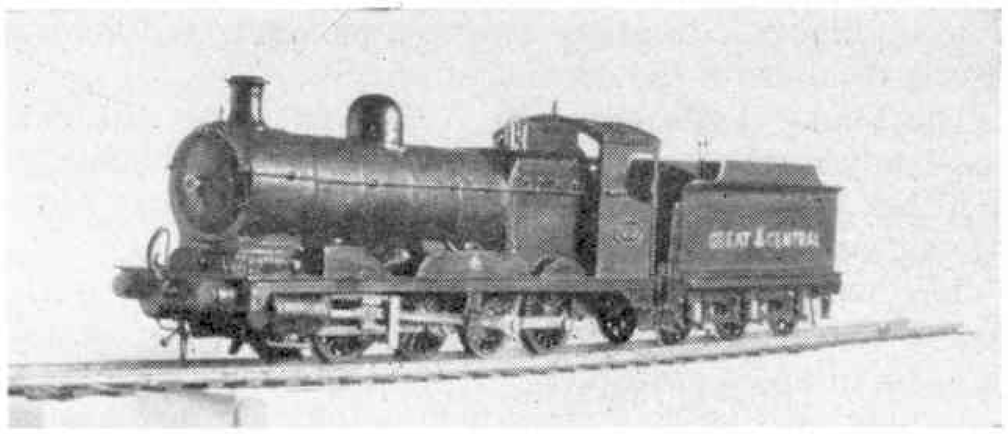
The railway enthusiasts have also been very busy. Layouts have been removed from the floor and the club's experts in model railway practice have been occupied for the better part of a month in re-laying them on a raised circular area within the club room. Now members are able to stand and operate their trains and rolling stock and the scheme is a great improvement on the previous arrangement.

The Meccano Section has had an average attendance of 100 per cent, and there has been almost a full attendance by the H.R.C. members. Leader, Mr. P. Bradford; Secretary, Daniel Babalola.

Lanky Tanks Fund

TWO WELL-KNOWN saddle tank locomotive types belonging to the former Lancashire and Yorkshire Railway Company became extinct when British Railways withdrew the last remaining examples of each type. One was a six-coupled engine rebuilt by Aspinall from a Barton-Wright tender 0-6-0 locomotive, and the other is one of the famous 'Pug' 0-4-0 saddle tanks. The 0-6-0ST locomotive was one of a class of 230 engines, and the survivor last worked in Swansea. The 'Pug' was one of 50 locomotives and, before withdrawal from service, was a works shunter at Horwich. Unfortunately, official preservation has passed by both types of tank engine, and soon they will be scrapped. Enthusiasts have, however, started a fund to purchase or preserve one or two of these last survivors. Contributions to the fund should be sent to Mr. R. S. Greenwood, 'Saddle Tanks Fund', c/o 14 Mere Street, Rochdale, and remittances should be crossed 'Westminster Bank Limited'.

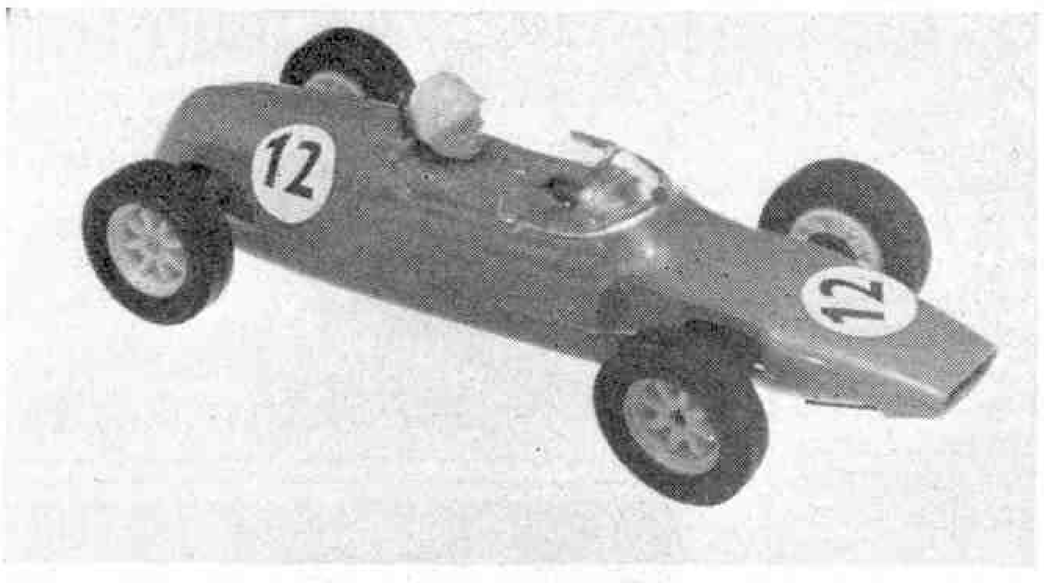
The only Lancashire and Yorkshire locomotives to be officially preserved is the narrow gauge shunting locomotive 'Wren', and the first 2-4-2T No. 1008. An 'A' class 0-6-0 tender locomotive, and a Barton-Wright 0-6-0 tender locomotive have both been purchased privately, however, and it is hoped to add to this list by the addition of the 'Pug' and the Barton-Wright tender 0-6-0.



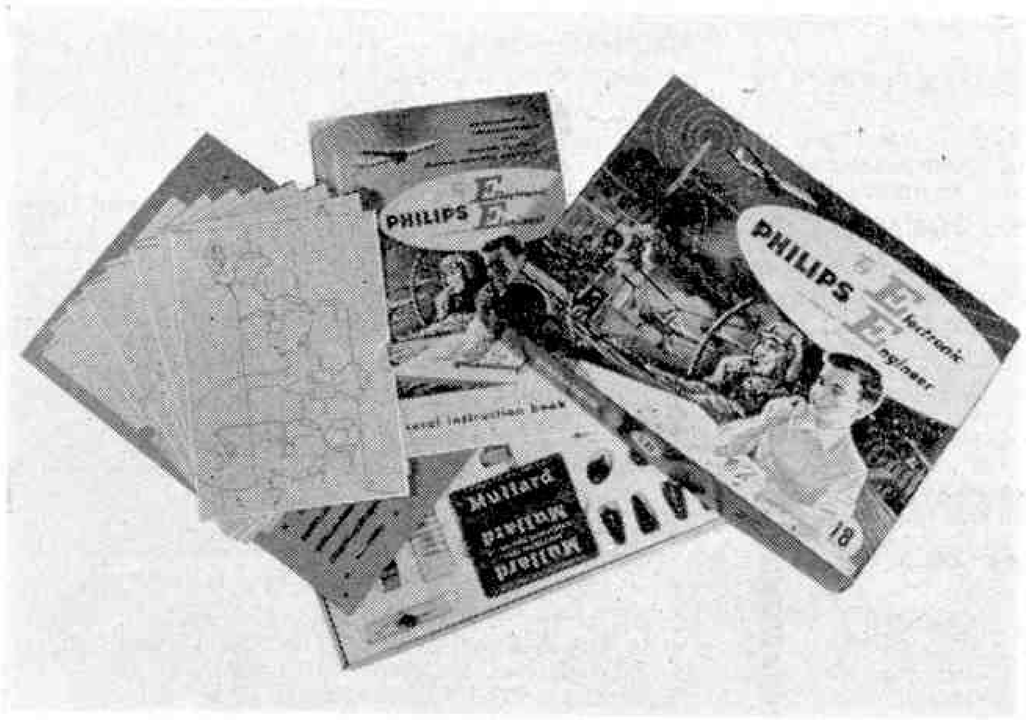
On show recently at the East Ham 'Leisuretime Exhibition,' was this model an 00 Gauge G.C.R. 0-8-0 locomotive and tender No. 1052 built by George Gammon, a member of East Ham and District M.R.C. The model was awarded first prize and voted to be the 'Model of the Year'

window SHOPPING

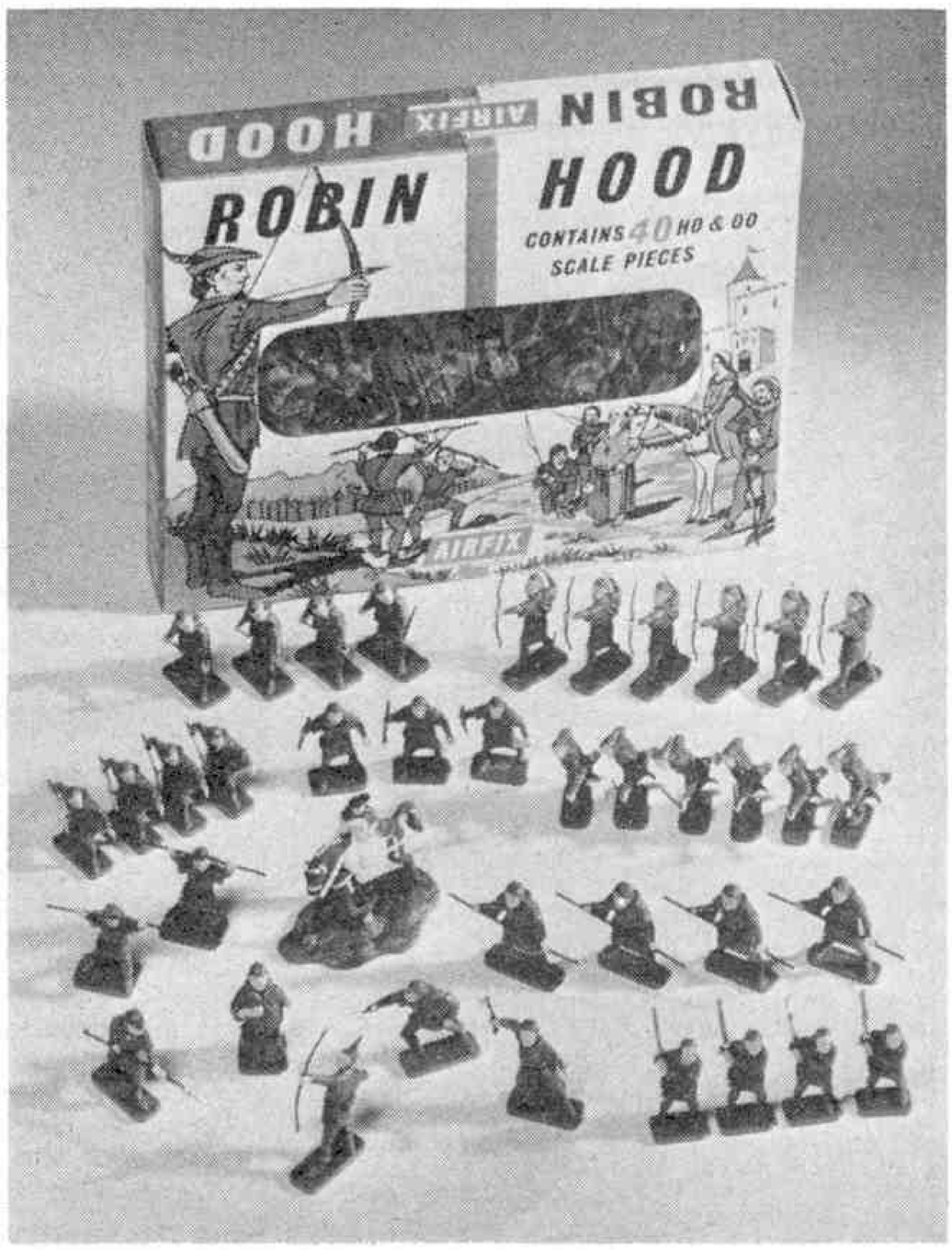
kits and models on the market



If you own a Scalextric Raceway you will no doubt want to add to your collection of racing cars by purchasing their latest Formula 2 C/66 Cooper. The model has Ackerman steering, sprung rear suspension and is fitted with the Formula Junior motor. Apart from being available from your nearest Scalextric dealer, this car is also included in Raceway Sets Nos. 30, 31 and 32. Price of the Cooper model racing car is **15s. 11d.**



Radios, morse-code signallers, all manner of different electrical and radio units can be built with the new Philips Electronic Engineer. A complete instruction book, giving diagrams and full details on how to build models, is included with each kit. The construction set is completely safe to use and if you are keen on becoming an electronics engineer, this set can teach you the basic facts about this modern career. The kits are available in various sizes and prices, the Model EE8 pack illustrated costs **£4 19s. 11d.**



Building model layouts of historic occasions can be quite interesting. Castles, forests, battle scenes—all can be reproduced by using the variety of scale models and figures available from hobbies or model shops. One of the latest additions to the range of OO Airfix figures is that of Robin Hood and his Merry Men. Friar Tuck, Maid Marion, Robin Hood and other well-known characters of Sherwood Forest are included in the 40 figures kit which costs **2s. 0d.** The figures are in tough, green plastic and only need painting.



Two fascinating books about sailing ship models have recently been released by Her Majestys' Stationery Office. The first book in the series deals with ship models from approximately 1300 BC to 1700 AD. The second in the series give details of sailing ships from 1700 AD to 1870. Both of these small handbooks are beautifully printed and all illustrations are in full-colour. It you want to learn the history of sailing ships there is no better way than buying these two books, **price 5s. 0d.** each.

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Readers Sales and Wants

Sales

• Obsolete Literature and parts for sale or exchange. Write Box 2000, c/o "Meccano Magazine".

• "M.M.'s", October 1927 to September 1959 with only 8 numbers missing. Also, Super Model Leaflets Nos. 1 to 37, half of which are originals, remainder full-size photostat copies. Offers with S.A.E. to D.J.B., 40 Streetly Lane, Sutton Coldfield, Warwickshire.

• Dinky and Corgi cars, sell separately or all together. S.A.E. details, Dean, 27 Woodwynd, Leam Lane Estate, Gateshead 10, Co. Durham.

• Mamod S.E.2 Stationary Steam Engine, little used, cost £3; sell 35/-. Austin, Westlands, Old Totnes Road, Newton Abbot.

• Merit's Racing Derby, Bell's Motor Racing Game, Escalado and Soccerette. Offers. A. Perkins, 19 Fawn Road, Chigwell, Essex.

• Hornby-Dublo 3-rail System. Please write for details. 38 Staunton Ave., S. Hayling, Hants.

• Dinky Military Vehicles, etc., also Hornby Gauge "0" Clockwork (large). All pre-1950. S.A.E. Lists. Wood, 96 Harton House Road, South Shields, Co. Durham.

• Old Meccano literature for sale, including Meccano Book of Instructions, No. 10. S.A.E. to J. Garner, 77 St. Georges Square, Oldham.

• Hornby "00", 3-rail; over 110 Rails; 3 Locos; Rolling Stock; Turntable; Electric Signals and other accessories. Details on request. R. Wade, "Blackcroft", Honiley, Kenilworth, Warwicks.

• Assortment "M.M.'s": 28 copies 1942-46, 65 copies 1953-58, mixed condition, 25/-. Wyatt, 27 Ledborough Lane, Beaconsfield, Bucks.

• Stamps from Africa, America, Asia and some Europe for sale. China, Russia, Egypt, U.S.A., etc., 50% Cat. Rc. Moses, 41 Parkleight Drive, New Moston, Manchester 10.

• Br. Cols. and foreign, wants invited. Advertiser, 15 Queenshill Ave., Leeds 17.

• Meccano Magazine 1942-58, bound in Green Buckram, unlettered, must be sold, any offer considered. N. B. Wilkie, 58A Craiglockhart Gardens, Edinburgh 11.

• Hornby Dublo 3-rail complete layout consisting of four power units and numerous accessories on trestle table. £12. 2 Rasslyn Crescent, Luton, Beds.

• M.E. Heron 1 c.c. aero-diesel. S.A.E. Whittaker, Lingerag, Buxton Road, Chinley, Stockport.

• Tri-ang "00" passenger train set, super 4 track including 3 joints, mint condition. S.A.E. for details. Paterson, 54 Fleet Road, Rochester.

• "M.M.'s" Jan.-July, Nov./Dec., 1955; Jan., 1956-June, 1964 (July 1958 missing). Good condition, £2. Also "Buses Illustrated", Jan. 1963-August 1964, 10/-. M. Thomas, 22 Douglas Rd., Worsley, Nr. Manchester.

• Complete Plimpton (No. 3) Bayko; also spare parts. S.A.E. for details. R. Doyle, Station House, Rosslare, Eire.

• Sale. Obsolete Meccano Part No. 167, Geared Roller Bearing, complete with special Pinion, as new. Accept the best offer. S.A.E. please. Daniels, 67 Holly Road, Twickenham, Middx.

Wants

• Pre- and early post-war Dinky Toys. Top prices paid. Details to: T. George, 124 North Lane, Aldershot, Hants.

• Obsolete Dinky Toys, etc. Highest prices, single or collections. Pinnock, 6 Stream Farm Close, Lower Bourne, Farnham, Surrey.

• Pre-war "M.M.'s", Manuals, etc. Obsolete Parts, especially 167 (Geared Roller Bearing). Also 1940 ERA Manuals. Particulars to Hearn, 50 Blundell Avenue, Horley, Surrey.

• Wanted: 3-rail Track, Locomotives, etc. Details to 88 York Road, Haxby, Yorks. Prompt reply appreciated.

• Pen-pal, 13-14, keen loco spotter. Edinburgh preferable. Letters to: T. Sugden, 341 Simonside Terrace, Newcastle upon Tyne 6.

• Look! Matchbox and Bookmatch collectors; why not join a club? Only 1/3 a year, including Membership Lists. Labels for sale from 1d. each to 5/- each. Sets from 1/- to 30/- each. Write now to: The Knowledge Matchbox Label Club (Lowestoft), the secretary, Mr. M. Smith, 12 Clarence Road, Lowestoft, Suffolk.

• French collector of Dinky Toys seeks models 105, 106, 112, 133, 153, 154, 162, 164, 171, 172, 183 and also latest models. Is prepared to buy from or exchange with English collector. Write to Mr. Malandain, 5 Rue Bernardin de St. Pierre, Le Havre (Seine-Maritime), France.

• Pre-war gauge "0" Locomotives and Rolling Stock. Any type or make. Single items or complete sets. Duroure, 27 Great Eastern Road, Hockley, Essex.

• Wanted. Stills from horror films. State price. Mackenzie, 14 Cameron Drive, Ardersier, Inverness-shire, Scotland.

• Dinky 35a, Austin Ruby, good condition. Write with price. Ord-Hume, 11 Haddon Drive, Woodley, Berks.

• Wanted: Pre-war and post-war back numbers of "Ships and Ship Models", bound or loose. Good price paid. Also back numbers "Model Maker". Peacock, 19 Treadwell Road, Epsom 21533.

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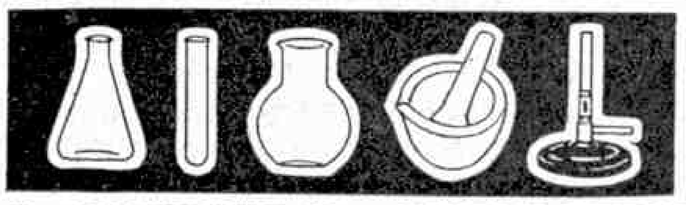
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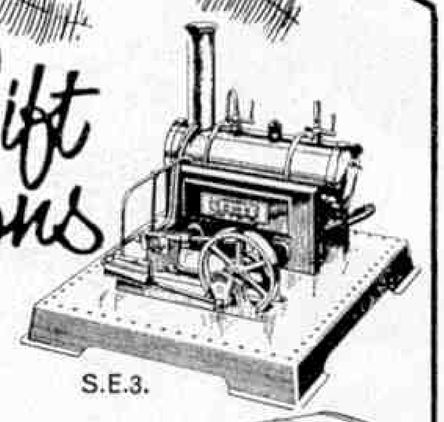
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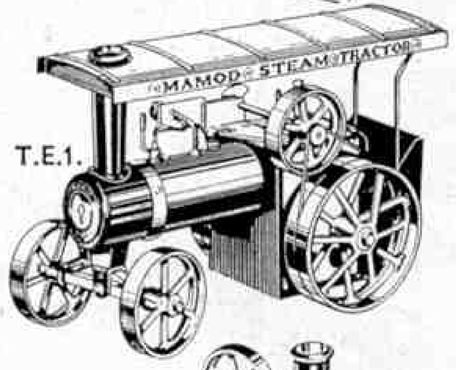
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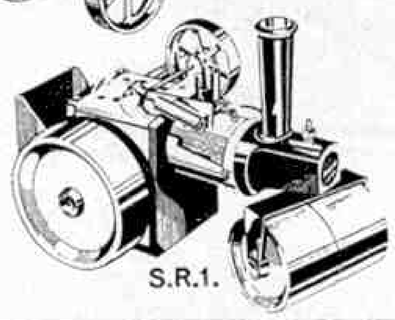
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January

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Sales/Wants (*Strike out which is not applicable*)

1	2	3
4	5	6
7	8	9
10	11	12
13	14	15
16	17	18
19	20	21
22	23	24

THIS IS THE

Play-Doh FUN FACTORY

ANOTHER MECCANO PRODUCT



makes basic shapes for building anything

Yes, it's a real toy factory . . . making a variety of blocks, logs, girders and other shapes that you can build into cabins, tables, chairs, boats, horses—in fact anything you like! You get a Fun Factory, 2 Dies with 10 shapes, a Trimmer, a Book of Ideas and a tub of Play-Doh Modelling Compound.
Play-Doh is soft and easy to use. It smells nice too—and doesn't mess up clothes or furniture. There's loads of fun in the Play-Doh Fun Factory.



FUN FACTORY 14/11d.

THE PLAY-DOH 3-TUB PACK



Contains 3 tubs of Play-Doh — Red, Yellow and Blue—can be mixed to make lots of bright new colours. **6/11d.**

Play-Doh

A GREAT NEW MODELLING MATERIAL





READY-TO-RUN electric train set

Start your own railway with this wonderful, low-price Tank Goods Set! The 2001 Set includes a track over 8 feet in circumference *PLUS a Hornby Power/Control Unit* which provides speed control and reversing at no extra cost.

TRACK PACKS ENLARGE YOUR LAYOUT

Add to your fun and increase your layouts with Hornby Track Packs. There are three to choose from containing extra rails and Simplex Points—and you can make many different layouts with every Pack.

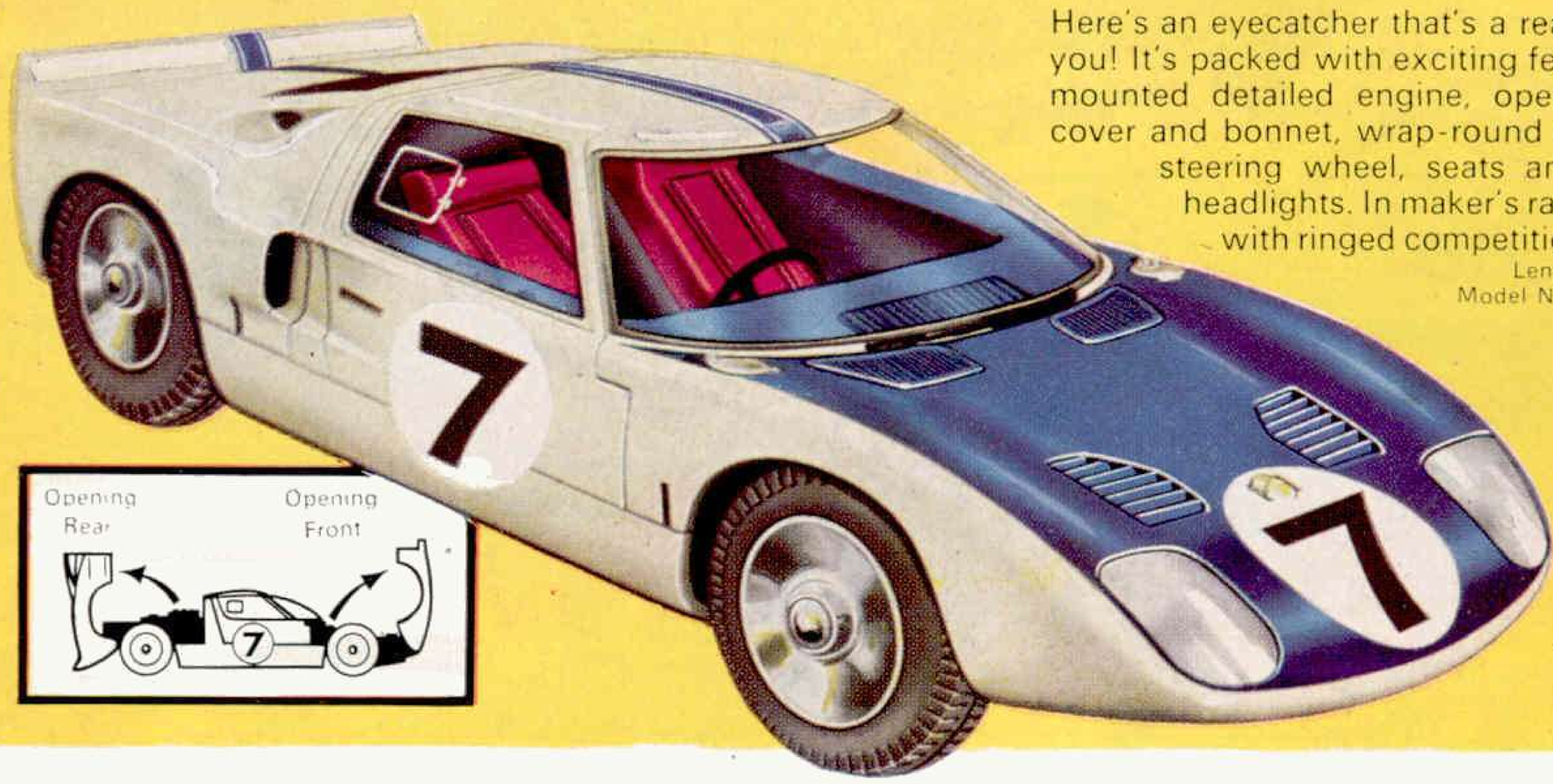
MADE AND GUARANTEED BY MECCANO LIMITED.



COMPLETE with power/control unit for only 85/-

THIS MONTH'S NEW DINKY MODELS

Off to a good start in 1965 with the FORD GT RACING CAR



Here's an eyecatcher that's a real winner for you! It's packed with exciting features—rear mounted detailed engine, opening engine cover and bonnet, wrap-round windscreen, steering wheel, seats and "special" headlights. In maker's racing colours with ringed competition number !

Length 3¼"
Model No. 215 **8/11**

And a good old stager the 1913 MORRIS OXFORD (BULL-NOSE)

A beautifully detailed model of a famous vintage car. It has an opening boot and detachable hood. "Brass" radiator, lamps and windscreen frame. Spoked wheels. Accurate chassis details. Driver in smart period costume.

Length 3¼"
Model No. 476 **7/11**





Always something new from **DINKY TOYS**

Obtainable at Hamleys, Harrods, Gamages, Selfridges and all good toy shops everywhere. Available overseas later.

precision-engineered by Meccano Limited

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